

~~FM 3-50~~

Reference

FM 3-50

DEPARTMENT OF THE ARMY FIELD MANUAL

Ch 1, 2

S/S by FM 3-50

July 1984

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CHEMICAL SMOKE GENERATOR UNITS

AND

SMOKE OPERATIONS

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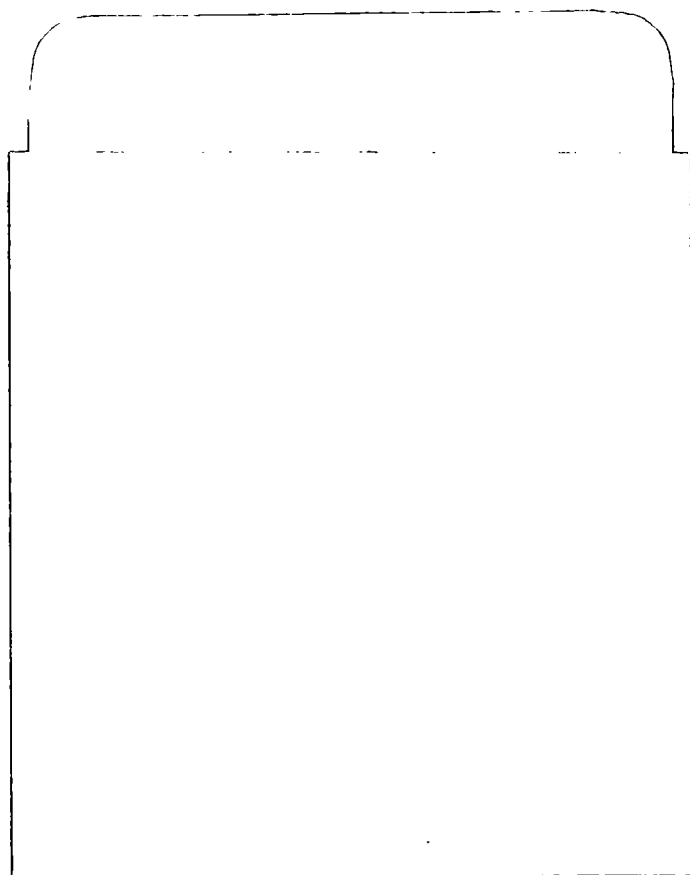


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CHANGE

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
 WASHINGTON, D.C., 18 November 1970

CHEMICAL SMOKE GENERATOR UNITS AND SMOKE OPERATIONS

FM 3-50, 20 April 1967, is changed as follows:

Page 3, paragraph 2. The last sentence is changed to read "The material in this manual is applicable to all levels of conflict, including stability operations."

Page 3. Paragraph 3 is superseded as follows:

3. Changes and Comments

Users of this manual are encouraged to submit recommended changes and comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commanding Officer, U.S. Army Combat Developments Command Chemical-Biological-Radiological Agency, Fort McClellan, Alabama 36201.

Page 3, paragraph 3.1. In line 4, "AR 320-5" is changed to read "AR 310-25."

Page 3, paragraph 4. Title of paragraph is changed to read "Mission of Chemical Smoke Generator Units."

Page 4. Paragraph 6.1 is added as follows:

6.1. Purpose of Smoke Operations

Smoke operations are conducted to reduce the effectiveness of hostile-aimed fire; deceive the

enemy as to the location and activities of friendly troops and installations; prevent enemy visual ground and air observation; and increase the problems of vehicular movement, and of communications, command, and control of enemy activities. Smoke is placed on enemy troops or installations, between enemy and friendly troops and installations, or on friendly troops and installations.

Page 18, paragraph 38a. The following is added at end of subparagraph: "However, smoke produced by mechanical smoke generators may be effective in winds up to 17 knots because of the great volume of smoke produced."

Page 18. Paragraph 38b is superseded as follows:

b. Wind direction. This is the direction from which the wind blows. The direction of the wind determines where the smoke source will be placed in relation to the area to be screened. In smoke operations the terms used to designate wind direction are: headwind, tailwind, flank wind, and quartering wind. For an explanation of these terms, see figure 8. Munition expenditures are smallest with flanking winds, greater with quartering winds, and greatest with headwinds or tailwinds. For information on the effects of wind direction on ammunition expenditures, see paragraph 97 (tables III and V).

Note. In figure 8, the area to be blinded is the area containing the enemy from which friendly activities are to be hidden.

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Page 19. Figure 8 is superseded as follows:

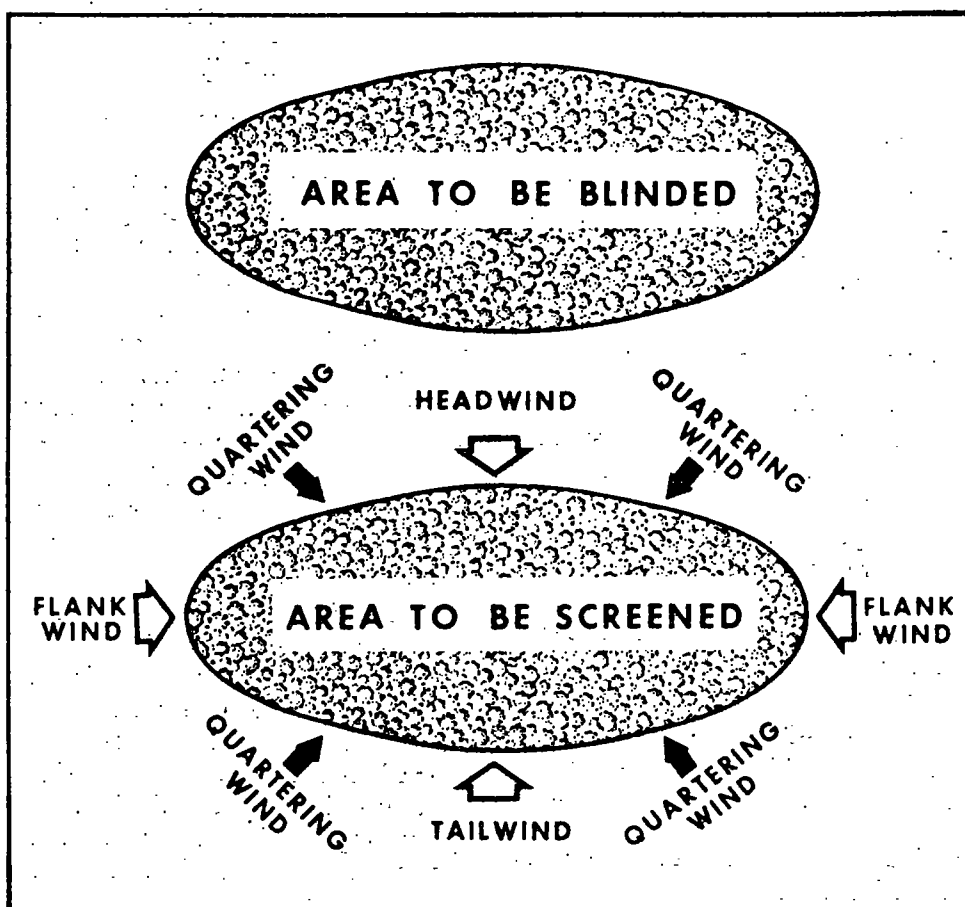


Figure 8. Method of designating wind direction.

Page 31, paragraph 66a. In line 11, the following sentence is added after the word "signs.": "The unit wire net can be established and wires tagged so that switchboards and telephones can be installed with maximum efficiency once the area is occupied."

Page 34, paragraph 74b. Subparagraphs (12) and (13) are added as follows:

(12) Operations of small units.

(13) Flamethrowers (in the assault).

Page 35. Paragraph 76 is superseded as follows:

76. Employment of Signaling Smoke

a. Signaling smoke is available in various colors (red, green, violet, yellow, and white) and can be used to—

(1) Mark friendly positions, landing zones, drop zones, and enemy positions.

(2) Transmit specific messages by prearranged color codes.

b. Artillery rounds and hand and rifle grenades can be used for the purposes indicated in a above by smoke emission on the ground. WP mortar rounds (white smoke only) can also be used.

c. Before smoke is used for signaling purposes, the following points should be considered:

(1) Use of burning-type smoke grenades can create a fire hazard under certain conditions, and expedient fire preventive measures may be required when smoke grenades are used under these conditions.

(2) When colored smoke is used to mark positions in dense jungle vegetation (triple canopy), as long as 5 minutes may be required for the smoke to penetrate the jungle canopy. A color that is readily distinguishable through dense

vegetation (such as red, yellow, or purple) should be used. The canopy sometimes makes any colored smoke impossible to see unless it is projected through the canopy by a grenade launcher.

(3) Since yellow and white smokes are hard to distinguish in fog or haze, a contrasting color (such as green, red, or violet) should be used. However, yellow, white, or green smoke is easily seen through shadows.

(4) The enemy may use the same color to create confusion as to the exact location of positions or to the meaning of the prearranged color code message and to entice aircraft within small-arms range. When signaling aircraft by means of colored smoke, never compromise the color by announcing it over the radio to the aircraft. Transmit merely the fact that "smoke is out." The aircraft should confirm the smoke (for example, "I identify yellow smoke.") and only then acknowledge the color (for example, "Roger, yellow smoke.").

d. For further information on the use of signaling smoke, see paragraph 118 and FM 21-60 and FM 23-30.

Page 36, paragraph 82a. Line 3 is changed to read "WP projected by mortars and WP and HC projected by artillery."

Page 41, paragraph 91. In line 3, "the army delivery systems" is changed to read "ground delivery systems." In line 8, "chapter" is changed to read "section."

Page 41, paragraph 93b. In line 1, "120 meters" is changed to read "1,200 meters."

Page 43, paragraph 95. In line 6, "OH-13" is changed to read "OH-6."

Page 43, paragraph 95a. Title of subparagraph is changed to read "UH-1 Delivery."

Page 44, paragraph 95b. In line 1, "B. OH-13 delivery." is changed to read "b. OH-6 Delivery." In first sentence, "OH-13" is changed to read "OH-6." In caption for figure 21, "OH-13" is changed to read "OH-6."

Page 44. Paragraph 95.1 is superseded as follows:

95.1. Helicopter Smoke-Generating Subsystem

This smoke-generating subsystem is a limited production item that is designed to produce a cloud of screening smoke by injecting atomized fog oil into the hot exhaust gases of the turbine

engine on UH-1 helicopters. The smoke screens produced by this subsystem can be used in support of ground troops during an air assault, and for the screening of medical evacuation, troop extraction, or retrieval of equipment such as downed aircraft. A satisfactory smoke screen is generated by this subsystem when the helicopter flies at speeds less than 90 knots below an altitude of 50 feet. The 50-gallon fog oil tank included in the subsystem provides enough fog oil for approximately 200 seconds of continuous operation. The 50-gallon fog oil tank permits a screen of approximately 7,000 meters in length to be established. The screen is approximately 5 to 10 meters in width. See TM 3-1040-253-13 for details on the operation of the subsystem.

Page 44, section II. Title of section is changed to read "DELIVERY OF SMOKE BY ARTILLERY AND MORTARS."

Page 44, paragraph 96. In line 3, "shells" is changed to read "and mortars." The following is added at end of second sentence: "and other thermally generated smoke munitions."

Page 45, paragraph 97 is superseded as follows:

97. Smoke Ammunition Expenditures

Expenditures needed in smoke operations vary considerably with each specific mission. Although smoke ammunition expenditure tables III through V have been calculated for various artillery weapons under a variety of weather and terrain conditions, they are useful as a guide only (also see tables 1 and 2 in FM 6-20-2). The amount of smoke ammunition required to maintain the smoke screen must be determined by observation rather than from the figures given in any table. The observer adjusts the fire mission to make necessary alterations in the impact area and expenditure of ammunition. The impact area is adjusted to conform to changing conditions and to cover holes and gaps in the screen. The observer and fire direction center procedures for conducting smoke missions are given in FM 6-40.

Page 46, tables III and V. In the statement under "OBSCURING SMOKE EFFECT," the following is added between "Number of" and "rounds": "WP or HC."

Page 47. Section I is superseded as follows:

Section I. INTRODUCTION

100. General

Special operations such as river crossings are those types of military operations which require specialized troops, equipment, or techniques.

a. Basic guidance regarding the use of smoke in support of special operations is contained in field manuals pertaining to these types of operations.

b. Some of the problems encountered in providing smoke support of special operations are contained in this chapter.

101. Support of Special Operations

The employment of smoke in support of special operations should be planned, prepared, and coordinated concurrently with the supported unit's plans and preparations for the operation.

102. Planning

The smoke unit commander must familiarize himself with the specific type of operation so that he and his staff can begin their planning by considering the special problems involved. Planning includes all the detailed steps previously discussed in this manual. Any modification of the techniques of smoke operations required to satisfy special circumstances must be included in the planning.

103. Training

A smoke generator unit that is to participate in a special operation should be trained under conditions similar to those anticipated for the operation. Personnel must be thoroughly trained to understand the problems involved in the special operation. Smoke generator units may be trained for a specific operation or for continued operations in an area of special conditions, such as in an arctic area or a jungle area. Rehearsals should be held with the supported unit, if possible.

Page 55, paragraph 117a. The following is added at end of subparagraph: "Smoke can be used in airmobile operations for signaling purposes. For additional information, see FM 57-35."

Page 56, paragraph 118b. The following is added as last sentence of paragraph: "See FM 23-30 for the employment of smoke grenades and ground signals."

Page 60, paragraph 134d. In line 5, "TA 23-100-series" is changed to read "CTA 23-100-series."

Page 61, paragraph 138. In last sentence, "FM 55-35" is changed to read "FM 55-30."

Pages 67 and 68. Appendix A is superseded as follows:

APPENDIX A

REFERENCES

1. Army Regulations (AR)

40-5	Preventive Medicine.
40-554	Prevention and Control of Communicable Diseases of Man—Venereal Diseases (Venereal Disease Epidemiologic Report).
310-10	Orders.
310-25	Dictionary of United States Army Terms.
310-50	Authorized Abbreviations and Brevity Codes.
750-5	Organization, Policies, and Responsibilities for Maintenance Operations.

2. Field Manuals (FM)

3-8	Chemical Reference Handbook.
3-10	Employment of Chemical Agents.
5-15	Field Fortifications.
6-20-2	Field Artillery Techniques.
6-40	Field Artillery Cannon Gunnery.
7-20	The Infantry Battalions.
7-30	The Infantry Brigades.

20-32	Landmine Warfare.
20-33	Combat Flame Operations.
21-5	Military Training Management.
21-6	Techniques of Military Instruction.
21-20	Physical Readiness Training.
21-40	Chemical, Biological, Radiological, and Nuclear Defense.
21-60	Visual Signals.
21-75	Combat Training of the Individual Soldier and Patrolling.
23-30	Grenades and Pyrotechnic Signals.
29-22	Maintenance Battalion and Company Operations (Nondivisional).
30-series	Military Intelligence.
31-16	Counter guerrilla Operations.
31-22	U.S. Army Counterinsurgency Forces.
31-23	Stability Operations—U.S. Army Doctrine.
31-70	Basic Cold Weather Manual.
31-71	Northern Operations.
31-72	Mountain Operations.
31-73	Advisor Handbook for Stability Operations.
33-1	Psychological Operations—U.S. Army Doctrine.
41-5	Joint Manual for Civil Affairs.
41-10	Civil Affairs Operations.
44-1	U.S. Army Air Defense Artillery Employment.
55-30	Army Motor Transport Operations.
57-35	Airmobile Operations.
100-5	Operations of Army Forces in the Field.
(C) 100-20	Field Service Regulations, Internal Defense and Development (IDAD) (U).
101-5	Staff Officers' Field Manual: Staff Organization and Procedure.
101-10-1	Staff Officers' Field Manual: Organization, Technical, and Logistical Data—Unclassified Data.

3. Technical Manuals (TM)

3-215	Military Chemistry and Chemical Agents.
3-240	Field Behavior of Chemical, Biological, and Radiological Agents.
3-1040-202-series	Generator, Smoke, Mechanical, Pulse Jet, M3A3.
3-1040-253-13	Operator's, Organizational, and Direct Support Maintenance Manual/Smoke Generating Subsystem, Helicopter: XM52.
11-5805-262-series	Switchboards, Telephone, Manual SB-22/PT and SB-22A/PT.
11-5820-284-series	Radio Receiving Set AN/GRR-5.
11-5820-401-series	Radio Sets AN/VRC-12 and AN/VRC-43, -44, -45, -46, -47, -48, and -49.

4. Department of the Army Pamphlets (DA Pam)

108-1	Index of Army Motion Pictures and Related Audio-Visual Aids.
310-1	Index of Administrative Publications.
310-3	Index of Doctrinal, Training, and Organizational Publications.
310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.

5. Miscellaneous

CTA 63-100-series	Ammunition for Training.
TB CML 100	Smoke Pot, HC, 10-lb, M1; and 30-lb, ABC-M5; Smoke Pot, Floating, HC, M4A2; SGF2, AN-M7; and SGF2, AN-M7A1.
TOE 3-266	Headquarters and Headquarters Detachment, Chemical Smoke Generator Battalion.
TOE 3-267	Chemical Smoke Generator Company.
TOE 33-500	Psychological Operations Organization.

Page 72. Paragraph 4 of appendix C is superseded as follows:

4. SERVICE SUPPORT. Admin/Log Order 14.

Page 74. Appendix D is changed as follows:

Title is changed to read "TYPE ADMINISTRATIVE/LOGISTICS ORDER FOR A

CHEMICAL SMOKE GENERATOR BATTALION." In line 8, "Administrative Order 14" is changed to read "Administrative/Logistics Order 14."

Page 76, appendix E. Delete "TM 11-295" from the list of references.

By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Distribution:

To be distributed in accordance with DA Form 12-11 requirements for Chemical, Biological and Radiological Operations.





CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 January 1969

CHEMICAL SMOKE GENERATOR UNITS AND SMOKE OPERATIONS

FM 3-50, 20 April 1967, is changed as follows:

Page 3, paragraph 2. In line 1, "a" is added preceding first sentence and the last sentence is changed to read "The material in this manual is applicable to all levels of conflict, including CBR operations and stability operations."

Page 3. Paragraph 2b is added as follows:

b. This manual is in consonance with the following International Standardization Agreement, which is identified at the beginning of each appropriate chapter or appendix in the manual: STANAG 2014, Operation Orders, Annexes to Operation Orders, and Administrative/Logistic Orders.

Page 3, paragraph 3. The last two sentences are changed to read "Comments should be forwarded direct to the Commanding Officer, U.S. Army Combat Developments Command CBR Agency, Fort McClellan, Alabama 36201. Originators of proposed changes which would constitute a significant modification of approved Army doctrine may send an information copy, through command channels, to the Commanding General, U.S. Army Combat Developments Command, Fort Belvoir, Virginia 22060, to facilitate review and followup."

Page 3. Paragraph 3.1 is added as follows:

3.1. Definitions and Terminology

The terms listed below are used throughout the manual. The definitions of these terms are taken from approved U.S. Army doctrine. For definitions of other terms, see AR 320-5.

a. *Selected Area.* As used in this manual, the term refers to an area to be concealed by smoke.

b. *Smoke Control Officer.* The officer designated by the smoke unit commander to coordinate and control the smoke operation.

c. *Smoke Control Point.* The point from which the technical control of a smoke screen is exercised. It is the center of signal communications for the unit and is occupied by the smoke control officer and his staff.

d. *Smoke Emplacement.* A fortified or prepared position for a mechanical smoke generator or smoke pot.

e. *Smoke Installation.* The smoke line plus all elements necessary for its maintenance and control, including unit command posts, fuel supply points, communication nets, control points, and observation posts.

f. *Smoke Line.* A series of smoke positions or emplacements established to accomplish a mission. This line may be fixed or mobile, straight or irregular.

g. *Smoke Position.* The location of a mechanical smoke generator or smoke pot.

Page 3, paragraph 5c. In line 3, "or communications zone" is changed to read "or within a communications zone."

Page 4, paragraph 6b. The last two sentences are changed to read "Unserviceable generators that cannot be repaired by unit personnel are exchanged for serviceable generators at the direct support maintenance facility or replaced through normal supply channels."

Page 4, paragraph 6c. In line 3, "or communications zone" is changed to read "or within a communications zone."

Page 5, paragraph 10. In line 8, "fields of study" is changed to read "matters."

Page 6, paragraph 13. The second sentence is deleted.

Page 7. Paragraph 16b is superseded as follows:

b. His specific duties are to—

(1) Command the battalion in the absence of the battalion commander, or when directed to do so.

(2) Establish the command post and provide communication facilities for the command.

(3) Direct operations of the command post.

(4) Supervise the installation, operation, and maintenance of communication nets.

(5) Study the tactical situation as affected by the status of equipment, supplies, and services; recommend priority of issue of regulated items.

Page 7, paragraph 17b(4). In line 1, "recom-
mends" is changed to read "recommend."

Page 8, paragraph 18b(2). In lines 1 and 2, "cordi-
nation" is changed to read "coordination."

Page 8, paragraph 18b(3) is added as follows:

(3) Normally assumes the duties of the smoke
control officer for the battalion.

Page 8. Paragraph 18d is superseded as follows:

d. His operational duties include the following:

(1) Reconnoitering sites for smoke lines,
command posts, observation posts, supply dumps,
and motor parks.

(2) Recommending assignment of smoke line
sectors to subordinate companies.

(3) Informing the commander and other staff
officers of the tactical situation and recommending
to the battalion commander actions to be taken by
the battalion.

(4) Analyzing the situation as affected by
the enemy, orders from higher headquarters,
actions of supported and adjacent units, and loca-
tion and capabilities of the battalion. He considers
the effects of casualties, replacements, terrain, and
weather, and the status of supplies and equipment,
as they apply to the mission.

(5) Maintaining an up-to-date situation
map; supervising the posting of friendly and
enemy information on the situation map.

(6) Recommending the general location of
the command post.

(7) Coordinating with the communications
chief in the preparation of the signal communica-
tions plan for communications between headquar-
ters, battalion units, supported units, and higher
headquarters.

(8) Distributing signal operation instruc-
tions (SOI) and standing signal instructions
(SSI).

(9) Planning troop movements, including
units involved, formation, and type of transporta-
tion required.

(10) Preparing the battalion operations order
for the commander's approval. Some material for
this order is obtained from other staff officers.

(11) Preparing operational after-action re-
ports and recommending training to correct any
combat deficiencies.

Page 11, paragraph 22. The first sentence is deleted
and in line 7, "operators officer" is changed to read
"operations officer."

Page 11. Paragraph 22c is superseded as follows:

c. A platoon leader is in command of each
platoon.

Page 11. Paragraph 22d is added as follows:

d. A company officer (normally the executive
officer) also performs the duties of the smoke
control officer.

Page 11. Paragraph 22.1 is added as follows:

22.1 Duties of Smoke Control Officer

The smoke control officer is located at the smoke
control point. He guides and regulates the smoke
unit in accomplishing its mission. His specific du-
ties are to—

a. Set up the smoke control point.

b. Obtain weather information.

c. Prepare firing diagram and operations
overlay.

d. Supervise activity of observation posts.

e. Control communications activity.

f. Supervise dummy screens.

g. Give "Make Smoke" and "Stop Smoke" com-
mands to smoke units.

h. Supervise the execution of the smoke plan
and direct the movement of smoke generators and
use of smoke pots as necessary to assure the accom-
plishment of the smoke mission.

Page 12, paragraph 23. Lines 1 and 2 are changed
to read "The ultimate purpose of training the
smoke generator unit is to prepare the", and lines
12 and 13 are changed to read "and FM 21-75;
DA Pamphlets 108-1 and 310-3; and references
listed in appendix A."

Page 12, paragraph 25. In line 7, the word "the"
is deleted from the end of the line.

Page 13, paragraph 27. The last sentence is
changed to read "Advanced unit training in a
smoke generator company integrates the company
headquarters and the platoons into a coordinated
unit proficient in operating as a separate company
or as a part of the chemical smoke generator
battalion."

Page 13. Paragraph 28a is superseded as follows:

a. *Operations of Smoke Generator.* This in-
cludes instruction in nomenclature, functioning,
characteristics, operating procedures, safety, and
preventive maintenance of mechanical smoke
generators.

Page 15, paragraph 30b. Lines 3-5 are changed to
read "3/4-ton cargo trucks, 1/4-ton utility trucks,
1 1/2-ton trailers, 1/4-ton trailers, and water trailers."

Page 15, paragraph 33. In line 1 "in friendly territory" is deleted.

Page 18. Paragraph 39 is superseded as follows:

39. Effects of Temperature Gradient

The temperature gradient is an expression of the air stability indicated by the difference in air temperature at two designated levels above the ground. It is determined by subtracting the air temperature at 0.5 meter above the ground from the air temperature at 4 meters above the ground. Vertical variations in the air temperature affect air stability, which in turn affects the formation of vertical air currents. The more stable the air layer in the target area, the more effective the smoke operation will be. For planning smoke operations, it is desirable to know when inversion, lapse, and neutral conditions are likely to occur and to understand how each condition is likely to affect smoke operations. The three air stability conditions are described below. Temperature gradients can be estimated if temperature measurements are not available.

a. Inversion. An increase in air temperature with an increase in height creates a stable or inversion condition, which usually exists at night and until about 1 hour after sunrise when windspeeds are generally less than 8 knots and cloud cover is less than about 30 percent. Over large bodies of water, weak inversion conditions tend to prevail during the day. Smoke rises and diffuses slowly during inversion conditions. Inversion conditions are favorable for smoke operations, particularly the production of a smoke blanket or a smoke haze.

b. Lapse. A decrease in air temperature with an increase in height creates an unstable or lapse condition, which usually exists during daylight when windspeeds are less than 10 knots and cloud cover is less than about 30 percent. Under unstable conditions, turbulence is great and many vertical air currents form, causing smoke clouds to rise and disperse quickly. Over large bodies of water, weak lapse conditions tend to prevail at night. A lapse condition is least favorable for smoke operations from a logistical point of view. However, effective smoke operations can be carried out under lapse conditions.

c. Neutral. No change in air temperature with height creates an intermediate or neutral condition, which is a transition state in the daily cycling from one form of air stability to the other—

with dawn and dusk being the approximate times for this transition. The turbulence and mixing of the air vary directly with windspeed, and windspeeds greater than those indicated for inversion and lapse conditions tend to reduce the temperature gradient to the neutral condition. A cloud cover of more than about 30 percent tends to reduce the temperature gradient to the neutral condition by controlling the rate of heat absorption and radiation by the ground. During neutral conditions, the characteristics of a smoke screen vary between those of lapse and inversion conditions. Neutral conditions under normal windspeeds are generally favorable for smoke operations, but neutral conditions with high winds are generally unfavorable for smoke operations.

Page 19, paragraph 40. The last two sentences are changed to read "Rainfall, snowfall, or fog decreases visibility; therefore, less smoke is needed for concealment. Heavy rainfall, snowfall, or fog may reduce visibility to the extent that the use of smoke may not be needed to provide concealment."

Page 20, paragraph 44. The sentence beginning in line 5 is changed to read "They are positioned so as to give maximum coverage (as permitted by the tactical situation)."

Page 20, paragraph 45. The first sentence is changed to read "To provide an effective coverage of a designated area, generator positions must be selected to provide maximum coverage under all meteorological conditions."

Page 21, table II. In line 4 of footnote 4, "generators" is changed to read "smoke pots."

Page 21, paragraph 46. The first sentence is changed to read "Generators may be emplaced on land, on boats, or on trailers."

Page 21, paragraph 46a. In lines 16 and 17, "extent" is changed to read "extend" and in line 19, "are" is changed to read "may be."

Page 21. Paragraph 46c is added as follows:

c. On Trailers. Under certain conditions, it may be advantageous to operate the generators from 1/4-ton trailers, particularly where the mission requires not more than one drum of fog oil per generator.

Page 24. Paragraph 49 is superseded as follows:

49. Responsibilities of Smoke Unit Commander

The smoke unit commander is responsible for all activities pertaining to establishing and maintain-

ing the smoke screen. He is responsible for preparation of a smoke plan to be submitted to the supported unit commander for approval.

Page 24. Paragraph 50 is superseded as follows:

50. Planning Considerations

Planning for smoke missions normally will begin with the commander of the supported unit, or with the smoke unit commander assigned to support the unit. The smoke unit commander and his subordinate leaders prepare a detailed plan (app B), and the smoke unit commander forwards this plan to the G3/S3 for approval; the G3/S3 forwards this plan to the supported unit commander for final approval. To meet his requirements, the smoke unit commander obtains the following information from the supported unit commander: the type of smoke mission, location of the area to be screened, time to make smoke, duration of the smoke operation, and immediate support available to the smoke unit. Based on this information, the smoke unit commander initiates the appropriate reconnaissance (map, ground, or air) and takes necessary action to obtain and evaluate other pertinent information that will affect the accomplishment of his mission. This additional information pertains to weather, terrain, supply, operational requirements, and effects of enemy action. The smoke unit commander must also plan the establishment of liaison, communications, and medical aid.

a. Some of the factors that could affect the smoke plan are:

(1) The vulnerability of the selected area to enemy observation, mortar, artillery, missile, or rocket fire or air attack.

(2) The efficiency of the friendly air-raid warning system.

(3) The weather and terrain conditions.

b. A smoke plan covers the following:

(1) Selection and designation of the smoke lines.

(2) Supply and maintenance of the smoke installations.

(3) Control of smoke operations.

(4) Communications.

(5) Security.

(6) Intelligence (meteorological data).

(7) Liaison.

(8) Road nets.

Page 25, paragraph 53. The sentences beginning in lines 21 and 22 are changed to read "Ground

reconnaissance includes communications reconnaissance. The unit communications officer normally prepares the signal communications plan."

Page 26, paragraph 55. In line 4, "plans his reconnaissance" is changed to read "plans the reconnaissance."

Page 26, paragraph 55a. In lines 3 and 4, "meteorological" is changed to read "meteorological."

Page 26. Paragraph 55b is superseded as follows:

b. *Reconnaissance Party.* Normally, the reconnaissance party should include the operations officer, communications officer, security personnel, and messengers, in addition to any other personnel the commander desires. It often includes representatives of the supported unit. When pressed for time, the battalion commander may require his company commanders to accompany the reconnaissance party. The size of the reconnaissance party may be limited by such factors as restrictions placed on movement and lack of transportation facilities.

Page 26, paragraph 56. Lines 1-10 are changed to read "Reconnaissance provides information required for formulation of the smoke plan, and must be as complete as time and the situation allow. Using information from the reconnaissance and all other sources, the estimate of the situation and the smoke plan are completed. The objectives of reconnaissance are to—"

Page 26. Paragraph 56b is superseded as follows:

b. *Determine Subordinate Unit Positions.* Based on the selected area and existing terrain and weather conditions, areas of responsibility for subordinate units are selected and designated (para 57).

Page 26. Paragraph 56c is superseded as follows:

c. *Select and Designate Smoke Lines.* Based on spacing requirements for smoke generators, the general location and length of smoke lines are designated; the smoke lines may be inner and outer rings around the area to be screened (para 45).

Page 27, paragraph 57a. Lines 6-8 are changed to read "This overlay aids the smoke control officer and the smoke platoon leaders in directing the shifting of generators."

Page 28, figure 14. The phrase "(For use in smoke control point only)" is deleted from bottom of figure.

Page 31. Paragraph 64b is superseded as follows:

b. *Security.* The smoke unit commander insures that appropriate security measures are taken against possible enemy actions such as infiltration; patrols; or ground, armored, or air attacks. Emphasis is placed on preventing surprise.

Page 31, paragraph 65. In line 9, the word "same" is added preceding the word "manner."

Page 31, paragraph 66. The second sentence is changed to read "Key personnel and equipment can be moved as an advance party to prevent congestion."

Page 31, paragraph 66b. Second sentence is changed to read "Designated personnel from the advance party should meet subordinate elements at this control point and guide them to their respective positions."

Page 31. Paragraph 66c is superseded as follows:

c. *Laying the Smoke Line.* Each smoke generator is assigned a position in the line, placed in position, and prepared for making smoke. The 1/4-ton truck and trailer should be camouflaged in the vicinity of the generator position. A drum of fog oil is unloaded at each generator position by the fuel supply platoon immediately upon occupation of the position. The platoon sergeant notifies the platoon leader when all the generators are ready to "make smoke." The platoon leader notifies the smoke control officer, who gives the order to "Make Smoke." All elements of the smoke line continue to improve their positions until they receive a warning order to displace. (See table I for spacing guide for generators.)

Page 32. Paragraph 67a(2) is superseded as follows:

(2) Natural obstacles may be used and supplemented by artificial obstacles, such as barbed wire, traps, mines, and field expedients. Tripwires connected to sound devices, flares, or flame field expedients may be used to give warning of the approach of the enemy at night (see FM 20-33).

Page 33, paragraph 72. In line 2, "relevent" is changed to read "relevant."

Page 35, paragraph 77b(2). The last sentence is changed to read "In a smoke generator company, this usually includes the executive officer, platoon leaders, the first sergeant, and the platoon sergeants."

Page 35. Paragraph 78 is superseded as follows:

78. Reconnaissance Planning

Upon receipt of an order assigning his unit a smoke screening operation, the smoke unit commander immediately proceeds to the unit which his organization is to support. Members of his staff may accompany him. Having received a statement of his mission, the smoke unit commander issues a warning order for his unit to prepare for deployment, and makes a map reconnaissance to determine the area to be screened. The smoke unit commander either makes or causes to be made a ground reconnaissance of the selected area (if the tactical situation permits). The reconnaissance is as detailed as time will permit.

Page 36, paragraph 80. Line 1 is changed to read "After the reconnaissance is completed, the", and in line 5, "his reconnaissance" is changed to read "the reconnaissance."

Page 36, paragraph 81. The introductory sentence is changed to read "After the orders are issued, the smoke unit moves to the selected area in accordance with the movement plan."

Page 37, paragraph 82b. In line 6, "an" is changed to read "on."

Page 43, paragraph 95a. Title of subparagraph is changed to read "a UH-1 Delivery."

Page 44. Paragraph 95.1 is added as follows:

95.1. Helicopter Smoke-Generating System

This smoke-generating system is a limited procurement item, designed to produce a dense cloud of screening smoke by injecting atomized fog oil into the hot exhaust gases of the turbine engine on UH-1 helicopters. The system can be used in support of ground troops during an air assault, and for the screening of medical evacuation, troop extraction, or retrieval of equipment such as downed aircraft. The system generates a satisfactory smoke screen when flown below an altitude of 50 feet and at speeds less than 90 knots. The system includes a 50-gallon fog oil tank (DTM 3-1040-253-13); however, personnel in the field have augmented the system to provide a 100-gallon fog oil supply. A 100-gallon supply of fog oil is exhausted in approximately 7 minutes by this system.

Page 46, table IV. In line 4, "Wind speed knots" is changed to read "Wind speed (knots)."

Page 47, paragraph 101. The title of the paragraph is changed to read "GENERAL SUPPORT."

Page 50, paragraph 109b. In line 5, "Snow or fog" is changed to read "Fog or falling snow."

Page 50, paragraph 111. The last two sentences are changed to read "However, smoke may be employed to screen an installation or the breaching of minefields and barriers, and to conceal artillery positions at night (smoke reduces the visibility of the muzzle flash). In addition to its primary use for screening, smoke may also be used for deception purposes in desert operations."

Page 51, paragraph 112a. The last two sentences are changed to read "These conditions make it extremely difficult to establish and maintain an effective smoke screen. The wind currents, eddies, and turbulence must be continuously observed and studied for their effects on smoke produced under these conditions."

Page 51. Paragraph 112c is superseded as follows:

c. Transportation and Supply. In some operations, lack of access roads may be a limiting factor in resupply of fog oil to generator positions. Where the terrain permits, tracked vehicles can be used when resupply cannot be made by trucks. Under conditions where supply cannot be made by ground vehicles and when priority of the smoke mission requires it, helicopters may be used for the transport of fog oil to generator positions.

Page 52, paragraph 113b(2). In lines 4 and 5, "through the appropriate chemical officer" is deleted.

Pages 52-54. Paragraph 114c is superseded as follows:

c. Means of Producing Smoke Screens. Floating smoke pots, mechanical smoke generators, and aircraft-delivered smoke systems may be used to establish and maintain smoke screens. Initial screens can be made by boats carrying generators (fig. 24) and/or smoke pots; naval rockets and gunfire; aircraft equipped with smoke tanks or smoke bombs; or by any combination of these. A screen initiated by aircraft can provide smoke protection for boats dropping smoke pots. Each boat carrying smoke pots may have a mechanical smoke generator to strengthen the protective screen. On shore the initial screen can be established by aerial delivery means and/or smoke projectiles fired from ships. After the assault elements have secured a foothold on the beach, smoke pots can be employed on the shore and used to maintain the smoke screen. Mechanical smoke generators are landed and used as soon as it is feasible.

Page 55, paragraph 116. The sentence beginning in line 8 is changed to read "The employment of smoke against armor materially reduces its move-

ment, effectiveness of direct fire, and observation capabilities."

Page 55, paragraph 117c(1). In lines 9 and 10, "Several curtains must" is changed to read "Several dummy curtains should."

Page 56. The title of Section IV is changed to read "STABILITY-TYPE OPERATIONS."

Page 56. Paragraph 119 is superseded as follows:

119. General

The doctrine for the employment of smoke generator units and for smoke operations in limited and general war operations applies, with modification, to stability-type operations. Smoke generator units may be required to support United States/host country (US/HC) tactical units in tactical operations, to support host country (HC) agencies conducting internal security operations, to provide assistance to HC forces in military civic action, or to provide military training teams (MTT) to HC armed forces or paramilitary forces. Generally, the use of smoke generator units or elements to provide screening smoke support for small-unit operations is not feasible. Instead, organic smoke devices such as aircraft-delivered smoke devices; ground-emplaced smoke pots or grenades; and smoke delivered by artillery, rocket, or mortar fire are used. See FM 31-16, FM 31-22, FM 31-23, FM 31-73, FM 100-5, and FM 100-20 for guidance on internal defense and development and stability-type operations.

Page 57, paragraph 120e(1). The last sentence is changed to read "See FM 31-16, FM 31-22, and the FM 7-series for detailed discussion of counter-ambush measures."

Page 58, paragraph 128. In line 7, "/company" is added after "battalion."

Page 59, CHAPTER 8. The following is added under the chapter title: "(STANAG 2014)."

Page 59, paragraph 131b. The first sentence is changed to read "Operation orders follow the 5-paragraph form outlined in FM 101-5 and STANAG 2014."

Page 60, paragraph 134d. In line 5, "TA 23-100" is changed to read "TA 23-100-series."

Page 61, paragraph 135. The second sentence is changed to read "The basic load of fog oil is three 55-gallon drums per generator", and the last line is changed to read "101-10-1 or FM 3-8."

Page 62, paragraph 141b. In lines 4 and 5, "and selects locations for the unit's from the RP to their area," is deleted.

Pages 67 and 68, appendix A. The following are added:

FM 31-23	Stability Operations—U.S. Army Doctrine
FM 101-5	Staff Officers Field Manual—Staff Organization and Procedure
TM 750-5-15	Army Equipment Data Sheets—Chemical Weapons and Defense Equipment
DTM 3-1040-253-13	Operator, Organizational and Direct Support Maintenance Manual; Smoke Generating System, Helicopter; XM 52

Page 68, appendix A. TM 3-500 and title is deleted.

Pages 67 and 68, appendix A. The titles of the following manuals are changed:

FM 3-8	Chemical Reference Handbook
FM 5-20	Camouflage
FM 21-40	Chemical, Biological, Radiological, and Nuclear Defense
FM 31-73	Advisor Handbook for Stability Operations

(C) FM 100-20 Field Service Regulations, Internal Defense and Development (IDAD) (U)

Page 67, appendix A. "FM 11-8" is changed to read "FM 24-21." The title is unchanged.

Page 69, appendix B. The following is added under the appendix title: "(STANAG 2014)", and the following line is added under map reference line: "Time Zone: ZULU."

Page 69, paragraph 2. In line 1 "GS" is deleted.

Page 69, paragraph 3b(1). "FSCE" is changed to read "FSE."

Page 70, paragraph 4. The title is changed to read "SERVICE SUPPORT."

Page 71, appendix C. The following is added under the appendix title: "(STANAG 2014)", and in the map reference line, "1: 100,000" is changed to read "1: 50,000."

The following line is added under map reference line: "Time Zone: ZULU."

Page 71. Paragraph 1c is added as follows:

c. Attachments and detachments.

(1) One fixed-wing aircraft from division aviation company.

(2) Attach one smoke platoon to 1/87 Infantry.

Page 70, paragraph 4. The title is changed to read "SERVICE SUPPORT."

Pages 74 and 75. Appendix D is superseded as follows:

APPENDIX D

TYPE ADMINISTRATIVE ORDER FOR A CHEMICAL SMOKE GENERATOR BATTALION

(STANAG 2014)

(CLASSIFICATION)

COPY NO. 3

811th Cml Bn (SG)

AICKIRCHEN (QU017323), GERMANY

031200 Jun 19 _____

GB 106

Administrative Order 14

Related OPORD 56

Map: GERMANY, 1: 50,000, REGENSBURG

Time Zone: ZULU

1. SITUATION.

a. This administrative order provides for combat service support for the 811th Cml Bn (SG) providing smoke support for 203d Inf Div.

(CLASSIFICATION)

(CLASSIFICATION)

b. 203d Inf Div Support Command provides combat service support to 85th Cml Bn (SG). Bn supported from division support area except as indicated in para 3.

2. MISSION. This battalion provides smoke support for 203d Inf Div along DONAU River.

3. MATERIEL AND SERVICES.

a. *Supply.*

(1) *Cl I.*

(a) Div distribution point, THONCOHE (PV967348).

(b) Schedule for distribution: All units—0145.

(2) *Cl II.* Army depot, ZELL (PV920290).

(3) *Cl III.*

(a) Army supply point for fog only: DEITFURT (PV890350).

(b) Div distribution point for all Class III, less fog oil: PAIN TEN (QV060370).

(4) *Cl IV.* Army depot, ZELL (PV967348).

(5) *Cl V.* ASP 902, DEITFURT.

(6) *Cl VI.* Same as Cl I.

(7) *Cl VII.* Div Support Center, ELCHOFEN (QU140335).

(8) *Maps.* Unit distribution (SOP).

(9) *Water.*

(a) Water supply point 1, ELCHOFEN (QU140334).

(b) Water supply point 2, NEVESSING (QU044240).

(c) Local water contaminated.

(10) *Captured materiel.* Bn SOP.

(11) *Salvage.* Bn SOP.

b. *Transportation.*

(1) Main supply route: WILLENHOFTEN (PV995441)—DUERLING (QV124357); two-way traffic.

(2) Highway WALDORE (QV095250)—HEMAU (QV035370); one-way.

(3) Highway DUERLING—BERATZHAUSEN (PV050420); one-way.

(4) Request clearance for all highway use through Bn S4.

c. *Services.*

Fld Svc Co, AICKIRCHEN. Shower and bath schedule:

21st Cml Co (SG); Hq, 11th Cml Bn (SG) ----- 1740-1810

51st Cml Co (SG) ----- 0940-1010

620th Cml Co (SG) ----- 1000-1030

69th Cml Co (SG) ----- 1050-1125

d. *Maintenance.* Div Support Center, ELCHOFEN (QU140335).

4. MEDICAL EVACUATION AND HOSPITALIZATION. Battle casualties evacuate through the facilities of 203d Med Bn.

5. PERSONNEL.

a. *Strengths.* Personnel daily summary as of 1800 submitted by 2000.

b. *Prisoners of war.* Process through Hq, SPTD UNIT.

c. *Morale and personnel services.* Mail pickup on 0700-1900 MSGR.

6. MISCELLANEOUS.

Special reports. Generator fire reports daily 1900.

(CLASSIFICATION)

(CLASSIFICATION)

7. COMMAND AND SIGNAL.

a. Signal. SOI Index 1-1 in effect.

- (1) SOI index 1-() 203d Inf Div is in effect.
- (2) Radio Silence until H plus 2 hr.
- (3) Bn relay station (QU185289) ALT NCS.

b. Command.

- (1) BN CP FRAUENHAUSEL (QU130253).
- (2) Smk positions complete by 040200.
- (3) Report CP locations.

Acknowledge.

SMITH
LTC

Distribution: A

OFFICIAL:

/s/ Jones

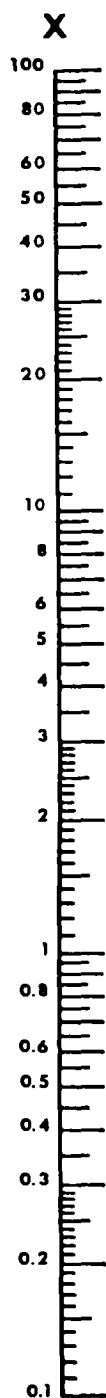
JONES

S4

(CLASSIFICATION)

APPENDIX F

CONVERSION SCALE



EXAMPLE:

1. Set 10 mph on X scale
2. Aline through point 8
3. Read 16 kmph on Y scale

+ 1
+ 2
+ 3
+ 4
+ 5
+ 6
+ 7
+ 8
+ 9
+ 10
+ 11
+ 12

X	NUMBER	Y
mph	8	kmph
mph	5	knots
mph	2	meters/sec
mph	7	ft/sec
kmph	4	knots
kmph	1	meters/sec
kmph	6	ft/sec
knots	3	meters/sec
knots	9	ft/sec
meters/sec	11	ft/sec
miles	8	kilometers
miles	5	nautical miles
kilometers	4	nautical miles
meters	11	feet
kilograms	10	pounds (avdp)
gallons (U.S.)	12	liters



By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
*Major General, United States Army,
The Adjutant General.*

W. C. WESTMORELAND,
*General, United States Army,
Chief of Staff.*

Distribution:

To be distributed in accordance with DA Form 12-11 requirements for Chemical, Biological and Radiological Operations.

TAGO 772A



FIELD MANUAL }
No. 3-50

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 20 April 1967

CHEMICAL SMOKE GENERATOR UNITS AND SMOKE OPERATIONS

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* This manual supersedes FM 3-50, 7 January 1959, including C2, 7 July 1964.

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CHAPTER 1

INTRODUCTION

1. Purpose

This manual is a guide for the commander and staff of the chemical smoke generator battalion and the smoke generator company in preparing the unit for and employing it in combat. It also furnishes doctrinal guidance for smoke operations with chemical smoke generators and other smoke delivery systems.

2. Scope

The material presented provides information pertaining to operation of chemical smoke generator units. It covers the mission, assignment, capabilities, limitations, organization, equipment, training, and techniques of smoke operations of the chemical smoke generator battalion and the smoke generator company. Information on the employment of chemical smoke generators and other smoke delivery systems including their use in special operations is also included. This information is applicable to nuclear and nonnuclear warfare, CBR operations, and internal defense and development operations.

3. Changes and Revisions

Users of this manual are encouraged to submit recommendations to improve its clarity and accuracy. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Originators of proposed changes which would constitute a significant modification of approved Army doctrine may send an information copy, through channels, to the CG, USACDC, Ft. Belvoir, Va. 22060, to facilitate review and follow-up. Comments should be forwarded direct to the Commanding Officer, U.S. Army Combat Developments Command CBR Agency, Fort McClellan, Alabama 36201.

4. Mission

The mission of the chemical smoke generator company is to provide concealment of troops or installations and to reduce direct visual observation by the use of smoke under all operating conditions. When the chemical smoke generator battalion operates as a unit, the mission of the battalion is the same as that of its companies.

5. Chemical Smoke Generator Battalion

The chemical smoke generator battalion is a flexible organization consisting of a headquarters and headquarters detachment and from 4 to 8 chemical smoke generator companies.

a. Characteristics and Capabilities. The battalion headquarters provides command or operational control of its attached companies. The area that a battalion can cover with smoke is proportional to the number of companies in the battalion. The battalion is a mobile unit that can move rapidly and operate over wide areas.

b. Limitations. The headquarters and headquarters detachment of the chemical smoke generator battalion is not organized to operate independently and must be augmented or attached to another unit for administrative and logistical support.

c. Assignments and Attachments. The chemical smoke generator battalion normally is assigned to a field army or communications zone as required. When assigned to a field army, the battalion may be attached in whole or in part to a corps or division for the purpose of supporting a special mission. The battalion may be controlled by attachment to the chemical group of the field army or comparable unit. Most missions require the attachment of several smoke

generator companies to the major unit being supported, usually a corps or division.

6. Chemical Smoke Generator Company

The chemical smoke generator company consists of a company headquarters, two smoke generator platoons of two sections each, and a fuel supply platoon of two sections.

a. Characteristics and Capabilities. The company can provide smoke hazes of approximately 1 to 8 kilometers in width (at the line of smoke generators) and several kilometers in depth, depending on weather and terrain conditions. It is capable of rapid emplacement and displacement of its 48 smoke generators. Its movements and tactical actions are coordinated with those of the unit it supports and with other smoke units. To accomplish its mission in combat, the company is equipped, organized, and trained to use weapons of close combat and to provide for its own administrative support. The company has the capability of defending itself against hostile ground attack. It is one hundred percent mobile and completely air transportable.

b. Limitations. The platoons are not organ-

ized to operate independently of the company. Consequently, platoons require special augmentation when required to operate on separate missions. If the company is employed in a secondary mission for prolonged periods of time, a period of retraining and readjustment may be required before the company is reverted to smoke missions. Generators forced out of action are repaired by unit personnel. If this is not possible, these generators must be exchanged for repaired or reconditioned generators at the direct support maintenance facility or replaced through normal supply channels.

c. Assignments and Attachments. The chemical smoke generator company is normally assigned to a field army or communications zone as required. The chemical smoke generator company may, and frequently does, operate separately and independently of the battalion. When this occurs, the company is attached to the unit it supports, normally a corps or division. Operational control and combat service support are provided by the unit to which the smoke company is attached unless the commander making the attachment orders otherwise.

CHAPTER 2

ORGANIZATION AND PERSONNEL DUTIES

Section I. CHEMICAL SMOKE GENERATOR BATTALION COMMANDER

7. General

The chemical smoke generator battalion is composed of a headquarters and headquarters detachment and attached chemical smoke generator companies. The battalion headquarters and headquarters detachment is the command administrative unit, and the companies perform the mission of producing smoke. When the companies are operating as part of the battalion, certain administrative functions of the company such as transportation, personnel, and supply, may be consolidated under battalion control. The battalion commander is responsible for consolidation. He weighs the advantages of consolidation against the disadvantages of the loss of training of the company as a self-sufficient unit, keeping in mind that the company may be detached to function separately.

8. Command Responsibility

The battalion commander commands the battalion and attached chemical smoke generator companies. He is responsible for the technical supervision of chemical smoke generator companies detached for special missions. His responsibilities are met by proper planning, timely issuance of orders, coordination, and his personal supervision. He must have a thorough understanding of all types of smoke operations and of the employment of smoke in the combat zone or in support of operations in areas not immediately threatened by enemy ground forces. His knowledge must include an understanding of the employment and operations of combat forces; he must thoroughly understand the techniques of supporting these operations with smoke. He must have the ability to gain the confidence of supported units and to work

with and complement the battle plans of these units. All these qualities are required to insure that the battalion commander's recommendations for the employment of smoke are sound and that they furnish the tactical commander with the maximum support.

9. Relationship with Company Commanders

The relationship of the battalion commander to his company commanders is one of direct contact. The battalion commander delegates authority and stresses the responsibility placed on subordinate commanders from the standpoint of not only initiating necessary action but also supervising all activities within their responsibilities. This command relationship is flexible enough to permit the battalion commander knowledge of the abilities of junior officers without violating the chain of command. This relationship is necessary to insure proper recognition and advancement of personnel.

10. Relationship with Staff

The battalion commander has a direct personal relationship with his staff and develops in them a sense of initiative and progressive thinking. He assures his staff of his support and develops a feeling of confidence in them. He uses his staff to perform details of his planning and orders, and to advise him in various fields of study. The commander advises his staff that they exercise no command and act only in the name of the commander. He keeps his staff informed of his policies and expects his staff to learn his desires and to react to satisfy them without specific orders. The battalion commander makes certain that a feeling of mutual cooperation exists between his staff and the company commanders.

11. Relationship with Supported Units

The battalion commander establishes command liaison as soon as possible with the commander of the supported unit, or his representative, to promote understanding of mutual or individual problems. He submits recommendations concerning the employment of his battalion and advises the supported unit commander of the capabilities and limitations of the battalion. He complies with the wishes of the supported commander to the limit of the capability of the battalion.

12. Action in Combat

The battalion commander coordinates the efforts of his companies to insure adequacy of support and successful completion of the smoke mission. He therefore positions himself in combat in the best place to control the operations of his battalion. The position may be at his headquarters, at the headquarters of the supported unit, or at the headquarters of one of his companies. Prior to absence from his headquarters, the battalion commander orients his staff on all pertinent matters.

Section II. HEADQUARTERS AND HEADQUARTERS DETACHMENT, CHEMICAL SMOKE GENERATOR BATTALION

13. General

The headquarters and headquarters detachment of the chemical smoke generator battalion is organized in accordance with the current TOE 3-266 (fig. 1). It currently consists of 5 officers, 1 warrant officer, 5 noncommissioned officers, and 17 enlisted men. The battalion staff consists of the executive officer, intelligence and operations officer (S2/3), the adjutant (S1), the logistics officer (S4), and the sergeant major. The detachment will be attached to, or is dependent upon, other units for mess, medical, and religious support.

14. Staff Responsibility

a. Staff officers are assigned specific functional areas of interest for which they have prescribed responsibility in the accomplishment of staff actions. Assignment of staff responsibility for a particular activity improves the efficiency of the staff by providing the following important features.

- (1) The commander is provided a single staff agency for advice and assistance in a particular functional area of command interest.
- (2) The staff and subordinate elements of

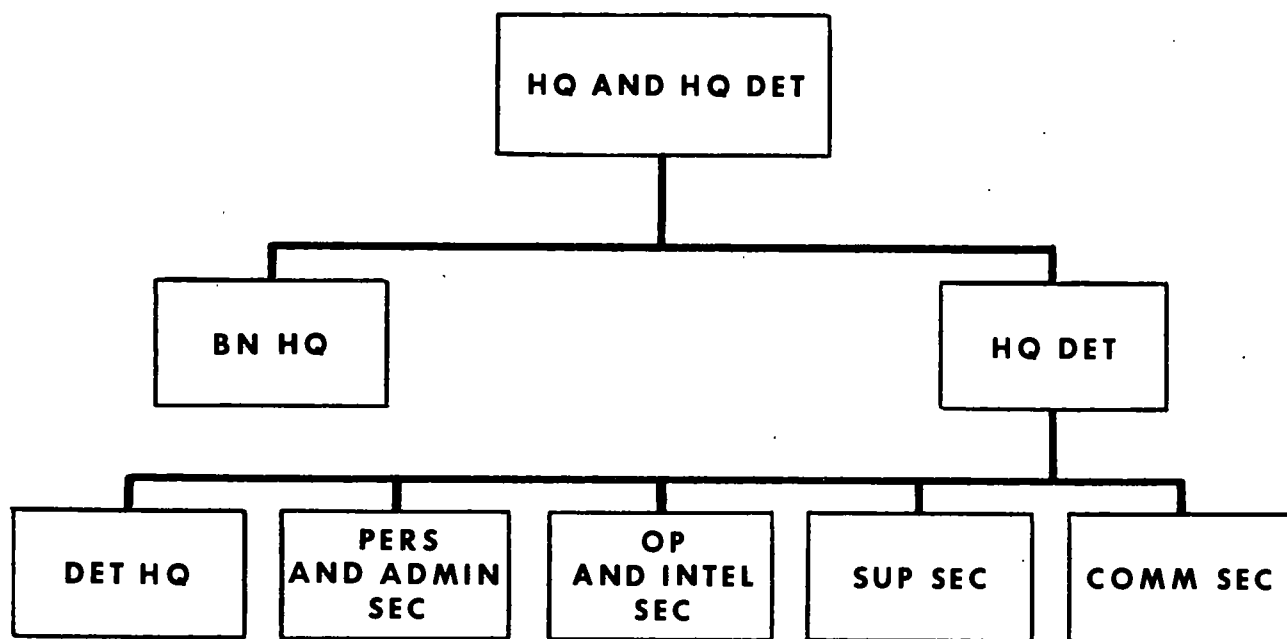


Figure 1. Organization of headquarters and headquarters detachment, chemical smoke generator battalion.

the command are provided with a commander's representative for a particular functional area of command interest with whom they coordinate or consult as necessary.

- (3) There is a positive assurance that all command interests receive staff attention.
- (4) Staff officers are able to give their complete attention to a manageable portion of command interests.

b. The assignment of staff responsibility carries no connotation of command authority over other staff officers or over any element of the command.

c. See paragraphs 16 through 19 for responsibilities and duties of the smoke generator battalion staff officers.

15. Staff Authority

a. The authority of the staff, or any particular staff officer, is the authority specifically delegated by the commander.

- (1) The commander normally delegates authority to the staff to take final action on matters within the command policy.
- (2) The authority delegated to individual staff officers varies with the mission of the command, the immediacy of operations and the relationship of the respective officer's staff area to the primary mission of the command.

b. When a staff officer, acting within his delegated authority, issues an order, responsibility for the effect of the order remains with the commander.

16. Executive Officer

a. The executive officer is the principal assistant and advisor to the battalion commander. He is usually charged with the responsibility for the execution of staff tasks, efficient and prompt response of the staff, and coordinated efforts of its members. He transmits the commander's decision to the staff sections, and to subordinate units when applicable, in the name of the commander. The executive officer keeps abreast of these situations and future plans.

During his commander's temporary absence, the executive officer represents him and directs action in accordance with the commander's policies. He is prepared to assume command of the battalion at any time.

b. His specific duties are to—

- (1) Command the battalion in the absence of the battalion commander, or when directed to do so.
- (2) Reconnoiter (as directed by battalion commander) sites for smoke lines, command and observation posts, supply dumps, and motor parks.
- (3) Assign sectors of smoke lines, as directed by the battalion commander, to subordinate companies.
- (4) Direct operations of the command post under supervision of the battalion commander.
- (5) Study the tactical situation as affected by the status of equipment, supplies, and services; recommend priority of issue of regulated items.
- (6) Establish the command post and provide communication facilities for the command.
- (7) Supervise installation, operation, and maintenance of communication nets.

17. Adjutant (S1)

a. The S1 has unit staff responsibility for personnel activities and other administrative matters not specifically assigned to another staff officer. He performs the personnel functions of those special staff officers who are not present in a battalion staff, such as the adjutant general, inspector general staff judge advocate, provost marshal, and special services officer.

b. His specific duties are to—

- (1) Issue pertinent instructions on strengths, records, and reports. This includes time of submission, period covered, format and channels.
- (2) Receive personnel replacements and arrange for their delivery to the units.
- (3) Coordinate and supervise burial and graves registration functions.
- (4) Recommends methods for building and

maintaining morale; submit recommendations for citations, decorations, honors, and awards; supervise the leave program; coordinate religious activities with the chaplains; plan, coordinate, and supervise the athletic and recreation program; and supervise other personnel services, such as postal and special services, as required.

- (5) Supervise the movement, internal arrangement, internal organization, and internal operation of the headquarters and arrange for quartering parties.
- (6) Act as civilian employee officer, to include procurement, utilization, and administration of civilian employees.
- (7) Process official correspondence.
- (8) Authenticate orders and instructions, except for combat orders and instructions.
- (9) Maintain records for the headquarters.

c. The unit personnel technician provides technical advice and assistance to the commander and is an assistant to the S1 in the area of personnel management. He processes all personnel actions that are sent to or through, or that originate at, the battalion. He provides the essential liaison between the companies and the supported unit or the assigned headquarters adjutant general section where all personnel records are maintained. In this capacity, he insures that request for personnel action and information are processed expeditiously. He trains, assists, and advises company administrative personnel.

18. Intelligence and Operations Officer (S2/3)

a. The S2/3 has staff responsibility for matters pertaining to intelligence, counterintelligence, organization, training, and combat operations of the battalion and attached units. Under the present TOE the battalion staff is not authorized an intelligence officer (S2), and since the operations and intelligence section of the battalion staff has been combined, the S3 has assumed responsibility for the supervision and operations of the intelligence function.

b. Among his duties, the S2/3—

- (1) Is the commander's principal advisor on organization of the battalion for

combat.

- (2) Has staff responsibility for coordination of the plan of fire support with the scheme of maneuver.

c. Among his specific training duties, the S2/3—

- (1) Prepares and has staff supervisory responsibility for the execution of training directives, programs, orders, field exercises, and maneuvers, based on plans approved by the battalion commander.
- (2) Selects training areas and allocates training aids and equipment.
- (3) Organizes and conducts battalion schools. Based upon the commander's directives, he prepares the program of instruction, selects and trains instructors, and recommends the selection of personnel to attend schools.
- (4) Makes training inspections, and prepares and supervises training tests based on army training tests.
- (5) Prepares training records and reports.

d. His operations duties include the following:

- (1) Informs his commander and other staff officers of the tactical situation and is prepared to recommend to the commander actions to be taken by the battalion.
- (2) Analyzes the situation as affected by the enemy, orders from higher headquarters, actions of supported and adjacent units, and location and capabilities of the battalion. He considers the effects of casualties and replacements, terrain and weather, and the status of supply and equipment, as they apply to the mission.
- (3) Maintains up-to-date information on the battalion and friendly units; supervises the posting of friendly and enemy information on the situation map.
- (4) Recommends the general location of the command post.
- (5) Plans troop movements, including units involved, formation, and type of transportation required.

- (6) Coordinates with the communications chief in the preparation of the signal communication plan to maintain communication between headquarters, battalion units, supported units, and higher headquarters.
- (7) Prepares the battalion operations order for the commander's approval. Some material for inclusion in the order is obtained from other staff officers.
- (8) Prepares operational after-action reports, and recommends training to correct combat deficiencies.
- (9) Distributes signal operation instructions (SOI) and signal standing instructions (SSI).

e. The specific intelligence duties of the S2/3 are—

- (1) Advise and assist the unit commander in all intelligence matters.
- (2) Produce and disseminate combat intelligence and information as required by the unit.
- (3) Initiate enemy, weather, and terrain intelligence requirements to the appropriate intelligence support echelon of the unit.
- (4) Interpret enemy, weather, and terrain information as it is received.
- (5) Assist in the preparation of intelligence derived by terrain analysis and reconnaissance missions of the unit.

- (6) Perform the functions of the unit security officer.
- (7) Supervise the conduct of all aspects of intelligence and security training.

19. Logistics Officer (S4)

a. The battalion S4 is the member of the battalion commander's staff charged with the staff responsibility for logistics. He supervises the activities of all logistical support elements in the battalion, both organic and nonorganic.

b. The S4 is responsible to the commander for the recommendation of logistical policy, and for planning, coordinating, and supervising the logistical effort. The S4 is also a logistical operator at this level. His duties include—

- (1) Advising and keeping the commander informed on logistical matters.
- (2) Planning, coordinating, and supervising all matters pertaining to logistics within the battalion.
- (3) Coordinating with the higher headquarters on logistical matters.
- (4) Assisting subordinate commanders with logistical matters.
- (5) Submitting logistical reports as directed.
- (6) Accomplishing area damage control planning.
- (7) Preparing paragraph 4 of the operation order.

Section III. CHEMICAL SMOKE GENERATOR COMPANY

20. General

The chemical smoke generator company is organized in accordance with the current TOE 3-267 (fig. 2). It consists of a company headquarters, a fuel supply platoon, and two smoke generator platoons.

a. Company Headquarters. The company headquarters consists of a headquarters section and a maintenance section with functions as follows (see para 105 for detailed functions):

- (1) Headquarters section is responsible for operations, mess, supply (excluding

generator fuels), personnel records, meteorological data, and communications.

- (2) Maintenance section supervises and assists in operator's maintenance; it performs organizational maintenance of generators, weapons, and vehicles.

b. Fuel Supply Platoon. The fuel supply platoon consists of a headquarters and two fuel supply sections. (See para 106 for detailed functions.) A section is composed of a section chief, 7 truck drivers, and 7 supply handlers. The

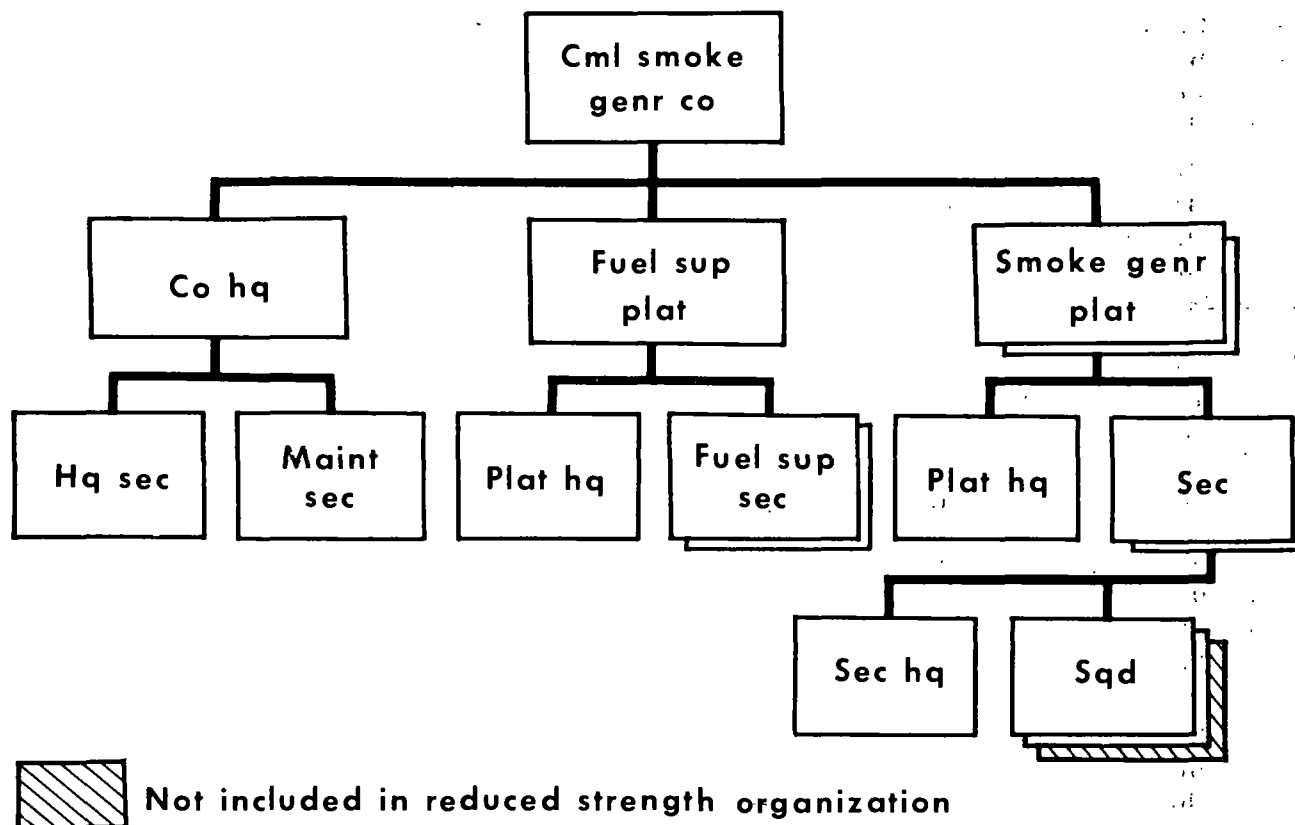


Figure 2. Organization of a chemical smoke generator company.

section transports and furnishes fog oil and gasoline to satisfy the fuel requirements of the smoke generator platoons. The section is also responsible for operating platoon dumps, the forward mission dumps, and the generator position dumps.

c. Smoke Generator Platoons. Each smoke generator platoon consists of a headquarters and two sections. (See para 107 for detailed functions.) A section consists of a headquarters and three squads. A squad is composed of 5 men—the squad leader, 2 smoke generator operators, and 2 smoke generator operator helpers. Each generator operator is trained to perform operator's maintenance on his generator and is trained as a light truck driver.

21. Responsibilities of Company Commander

The company commander organizes his headquarters personnel as a company staff and utilizes them in a manner similar to that of the

battalion staff. When the company operates separately from the battalion, the company commander has additional functions and responsibilities similar to those of the battalion commander.

a. Relationship with Company Personnel. Smoke operations require that individual smoke generator positions be separated by varying ground distances. Consequently, the advantages of close team support and comradeship are normally lost. The smoke generator operator is normally alone in a combat position for relatively long periods of time. For this reason the commander must devote considerable effort to developing a proper mental attitude in the personnel of his command. Morale and esprit de corps take on an even greater meaning to the individual when he is alone and normally in an area of low visibility. His training must harden him physically and mentally for these conditions, and in this training his confidence in leadership at all command levels becomes a most

important factor. The smoke unit commander must continuously foster this feeling of confidence by his own attitude of confidence in his subordinates and by his enthusiasm and aggressiveness.

b. Relationship with Supported Units. The relationship of the company commander to the supported unit commander is similar to that of the battalion commander (para 11). In addition, the company commander stays as close to the supported unit commander as required. He frequently accompanies the supported unit commander, or members of his staff, to forward positions in order to acquire better information of his mission and to more fully understand the problems confronting the supported unit. He is responsible for liaison with the supported unit and must be certain that communications are continuous and that his unit has sufficient information about the plans and operations of the supported unit.

c. Actions in Combat. The commander positions himself in combat in the best place to command his troops and to control the operations of his unit. This position may be with the supported unit or in forward observation posts. Other times his presence will be required at the smoke control point. The smoke control point refers to the location of the smoke control offi-

cer who is responsible for the control of the smoke-generating equipment. The commander makes his presence felt by personal visits to various smoke positions, regardless of their locations. In close proximity with enemy forces, he should coordinate closely with the supporting unit when visiting smoke positions. He must display courage and coolness under combat conditions and must impart these qualities of leadership to his subordinates. He must personally set the example in combat that he expects his troops to achieve.

22. Duties of Company Officers

The smoke generator company is currently authorized 4 officers in addition to the company commander. The duties of the company officers are similar to those of the officers on the battalion staff in corresponding positions. The company executive officer serves as the intelligence/operators officer. The company officers and their duties are as follows:

a. The executive officer also serves as communications officer.

b. The platoon leader of the fuel supply platoon also serves as motor transport officer.

c. Platoon leaders, one each in command of a platoon.

CHAPTER 3

TRAINING

23. General

The ultimate purposes of training the chemical smoke generator battalion is to prepare the unit to fulfill its mission in a combat support role to conceal friendly troop operations and to deceive the enemy of intentions by the production of smoke screens. Personnel, therefore, are trained as technical specialists to operate as a team. In addition, troops are trained to fight as infantrymen to protect themselves and their installations. For detailed information on training, refer to FM 21-5, FM 21-6, FM 21-20, and FM 21-75; DA Pamphlets 310-3 and 310-5; and references listed in appendix A.

24. Training Objectives

The objective of training the headquarters and headquarters detachment, chemical smoke generator battalion, is to develop the command and staff techniques for technically supervising and operationally controlling the chemical smoke generator companies. The objective of training the chemical smoke generator company is to qualify the unit to produce smoke as required, to move rapidly during combat, to defend its installations from enemy attack, and to operate as an independent unit. The training objective may be designated by a higher headquarters to develop a unit to perform anticipated missions by a specified target date.

25. Training Management

Training management involves the planning and directing of training to develop a unit to accomplish its mission with the means available in a specified period of time. The quality and thoroughness of training are directly proportional to the amount of active and personal supervision given to training activities by the the battalion commander, company commander, platoon leader, and noncommissioned officers.

a. Training Programs. The unit training programs and schedules are based upon the current army training programs (ATP), the unit commander's estimate of the training situation, and instructions from higher headquarters. In any training situation, there are a number of variables which affect the methods of training used, the subjects selected for instruction, the sequence of presentation of instruction, and the time allotted to each subject.

b. Training Cycles. The training of units and personnel is divided into the following phases: basic combat, advanced individual, basic unit, and advanced unit; and into field exercises and maneuvers.

c. Postcycle Training. Training continues after the unit completes the program given in the ATP. It may be necessary to conduct retraining or additional training on subjects found to be deficient during army training tests, field exercises, or maneuvers. The commander may direct that additional training be conducted in operational subjects not covered in army training programs, to include practice alerts, automatic weapons in an air defense role, over-water safety procedures, and aircraft recognition.

d. Cadre Training. During the training period, each unit is required to train and maintain a qualified cadre.

e. Training Records. Suitable training records are maintained to provide a basis for necessary review and/or retraining.

26. Individual Training

The individual training phase includes basic combat training and advanced individual training. Advanced individual training in a smoke generator unit teaches the basically trained soldier his occupational skills and prepares him

to function effectively as a member of the smoke generator unit. The ATP gives suggested methods and procedures for specialist training. Commanders will emphasize small-unit leadership training. Maximum use will be made of on-the-job opportunities and schools for this training. Assignment of duties and responsibilities will be commensurate with the grade and abilities of the noncommissioned officers concerned.

27. Unit Training

The unit training phase provides team training which is subdivided and conducted in basic and advanced phases. Basic unit training provides opportunity for the soldier to learn the value of teamwork and to practice, as part of a small team, the skills he acquires in individual training. Advanced unit training in a smoke generator unit integrates the company headquarters and platoons into a coordinated company proficient in operating as a separate unit and as part of the chemical smoke generator battalion.

28. Technical Training

Enlisted personnel receive technical training during the advanced individual training phase and during the unit training phase. This technical training consists of instruction in the following subjects:

a. Operations of Smoke Generator. This includes instruction in nomenclature, functioning, characteristics, operation, maintenance, and repair of mechanical smoke generators.

b. Generator Emplacement and Smoke Production. This includes instruction in how to select positions and prepare emplacements; the protection of equipment from hostile fire; variations required by the smoke plan, meteorological conditions, and areas to be screened; and camouflage requirements of smoke generator positions and emplacements.

c. Fuel Supply. This includes instruction in the grades and types of fuels used in smoke generators, necessary modifications for variation in temperature, storage methods in camps and at generator positions, fuel transfer, transportation of fuel, and safety precautions in the handling and storage of fuel.

d. Auxiliary Smoke Equipment. This includes instruction in nomenclature, functioning, methods of firing, smoke-producing capabilities, and limitations of smoke pots and grenades; and familiarization with smoke-producing methods of other arms and components of the Armed Forces, including artillery and mortar smoke shell, smoke from aircraft, and navy smoke-generating methods.

29. Employment of Smoke in Training for a Chemical Attack

Both artillery- and aircraft-spray-delivered smoke may be used in training to visually demonstrate the behavior of toxic chemical clouds. Such use of smoke in training is particularly valuable to those directly participating in planning and executing chemical attacks by demonstrating cloud travel.

CHAPTER 4

SMOKE OPERATIONS

Section I. EQUIPMENT AND MUNITIONS

30. General

Chemical smoke generator units normally operate with the equipment authorized in the TOE. The equipment issued is governed by

availability and is limited to actual need. Additional equipment may be obtained if units are separated or are detached on special missions.

a. *Weapons.* Organizational weapons include



Figure 3. M3-type mechanical smoke generator in operation.

7.62-mm rifles; caliber .45 pistols; 7.62-mm machineguns; caliber .50 machineguns and 40-mm grenade launcher.

b. *Vehicles.* Authorized vehicles provide complete mobility and include 2½-ton cargo trucks, ¾-ton cargo trucks, ¼-ton utility trucks, and trailers. Each company is provided water trailers.

c. *Communications.* Adequate communications equipment is provided for installation of necessary organic radio and telephone nets for communication with higher headquarters and for entry into the communications systems of supported units. Additional communications equipment may be authorized for special missions.

d. *Tools and Repair Parts.* Chemical smoke generator units are authorized tools in accordance with TOE and repair parts in accordance with the Department of the Army technical manuals/supply manuals for maintenance of equipment.

31. Mechanical Smoke Generators

The mechanical smoke generator is a device that vaporizes fog oil and releases it to condense in the air as a white smoke useful for large-area screening. Detailed data pertaining to the standard M3-type mechanical smoke generators, together with operating and maintenance instructions, are given in the TM 3-1040-202-series. The M3-type mechanical smoke generator (fig 3) has a pulse-jet engine that has only one moving part—a 16-petal engine valve. The engine uses approximately 3 gallons of gasoline per hour. Smoke is produced when fog oil is injected into the engine tube while the engine is in operation. Fog oil is

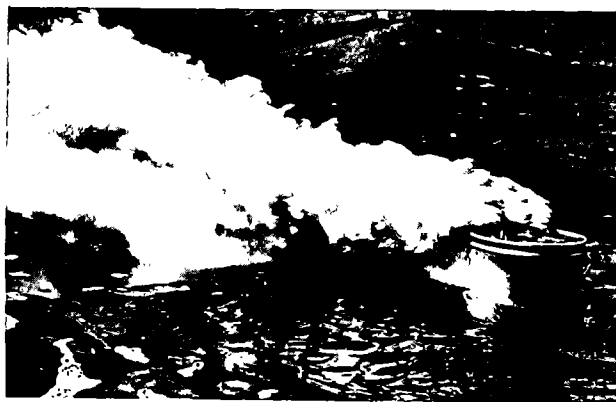


Figure 4. Floating smoke pot.

atomized by the hot combustion gases that move past the fog oil injection nozzle at high velocity. The generator vaporizes 25 to 50 gallons of fog oil per hour. The generator may be operated on the ground, from a truck or boat, or on any other reasonably level base. Because of its simple construction, this generator may be operated continuously for extended periods with normal maintenance.

32. Smoke Pots

There are two basic types of smoke pots—the burning-type (filled with HC smoke mixtures), and the thermal generator-type (filled with SGF fog oil). The M1 10-pound and the ABC-M5 30-pound smoke pots are HC munitions for use on land only; the M4A2 is an HC munition for use on water or land. The AN-M7 SGF2 and AN-M7A1 SGF2 floating smoke pots are oil-filled munitions that are suitable for use either on land or water. Both types of smoke pots are described in detail in TB CML 100. Figure 4 illustrates a floating smoke pot.

Section II. TYPES OF SMOKE SCREENS

33. General

In friendly territory, a smoke generator unit can produce three types of smoke screens: smoke blanket, smoke haze, and smoke curtain (fig. 5).

34. Smoke Blanket

Smoke blankets are used over friendly areas

to hinder visual enemy aerial observation, visual precision bombing, and direct fire. Smoke blankets are formed by the gradual merging of individual smoke streamers downwind from the smoke line. Use of a smoke blanket may restrict movement and activity within the screen, thus hampering operations of friendly troops. Smoke clouds produced by mechanical

A SMOKE BLANKET prevents enemy aerial visual observation.



B SMOKE HAZE reduces enemy visual observation.



C SMOKE CURTAIN prevents enemy ground visual observation.



Figure 5. Types of smoke screens.

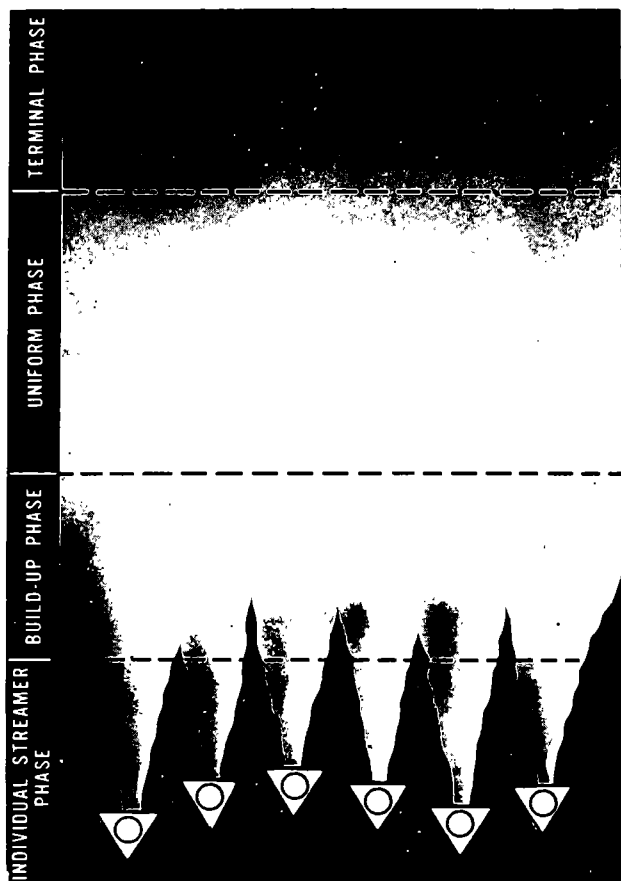


Figure 6. Formation of a smoke blanket.

generators may extend 1.6 to 6.4 kilometers; smoke from pots is seldom effective for more than 300 to 500 meters. The four phases of the formation of a smoke blanket are as follows (fig. 6):

a. Individual Streamer Phase. For a certain distance downwind of the smoke line, the smoke from generators or pots travels as individual streamers. Each streamer eventually merges with other streamers. The distance traveled by the smoke before it merges depends on the speed of the wind, air stability, the relationship of the smoke line (line of generators) to the direction of the wind, and the distance between generators along the smoke line.

b. Build-Up Phase. When the smoke from the individual streamers begins to merge, the smoke blanket begins to build up in uniformity but does not take its final form immediately. For a distance downwind from the line of merg-

ing, the smoke shows a general unevenness of mixture.

c. Uniform Phase. The end of the build-up phase is characterized by a uniformly obscuring screen. The extent of the screen is determined by the quantity of smoke produced by each generator in a time frame with relation to the other generators, by the distance between generators, and by meteorological conditions.

d. Terminal Phase. As the smoke cloud moves downwind, it thins because of diffusion and settling out of the larger particles. The terminal phase is reached when no effective screening is obtained.

35. Smoke Haze

Smoke hazes are used mainly in the combat zone to conceal friendly activities from observa-

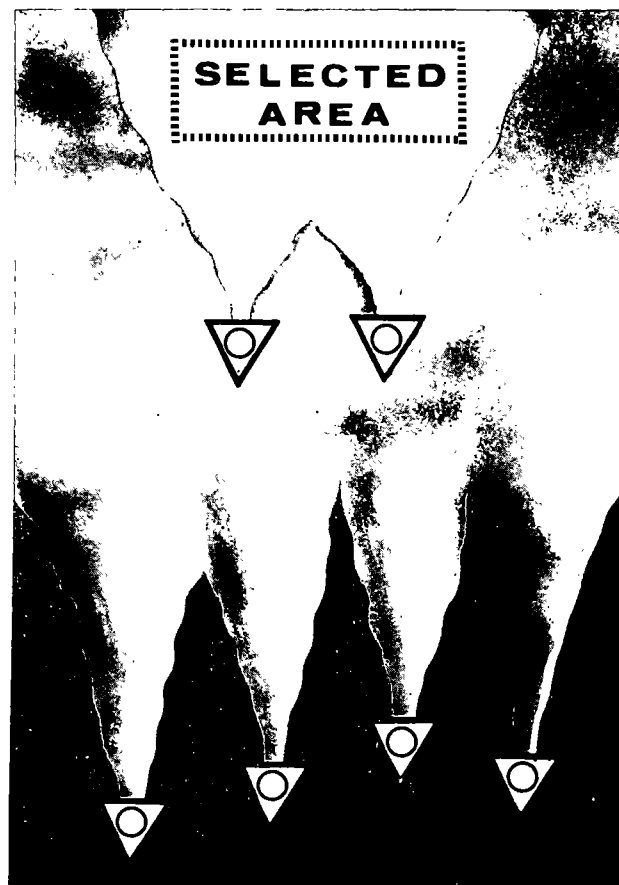


Figure 7. Formation of a smoke haze.

tion and reduce ground observed fire. They are formed in much the same manner as smoke blankets are formed. Since a haze is usually less uniformly dense than a blanket, the positions of the generators in the smoke line are regulated to produce the quantity of smoke desired. Sometimes the generators are spaced farther apart, or more distant from the area smoked; usually they are placed in an irregular pattern. Generators may be placed so as to increase the density of smoke around installations that need more screening. Use of a smoke haze will allow movement of vehicles and troops within the screen, thus allowing near normal operations. The field behavior of a smoke haze

(fig. 7) is essentially the same as that of a smoke blanket.

36. Smoke Curtain

Smoke curtains are used mainly in the forward edge of the battle area to obscure or restrict enemy ground observation of friendly positions and activities. A smoke curtain is a dense vertical development of smoke rather than a horizontal blanket spread out over an area. It does not prevent enemy aerial observation, since it is placed between enemy positions and friendly positions. Smoke curtains may also be produced by artillery, mortars, or aircraft.

Section III. EFFECTS OF WEATHER AND TERRAIN

37. General

The effects of weather, particularly wind speed and wind direction, and terrain are important factors to be considered in smoke operations. Since a smoke screen must be continuous to be effective, those factors which tend to create gaps in the screen need to be evaluated carefully in setting up a smoke operation. The forecast for the area of operations is obtained periodically from the CBRE, Air Weather Service (AWS), or the intelligence section of the supported unit. The success of a smoke mission depends greatly on correct interpretation of meteorological data, observation of the screen in relation to the terrain while the smoke-producing equipment is in operation, the subsequent estimate of the behavior of the smoke, and the ability of the smoke unit to maneuver the equipment into new positions as required. See TM 3-240 for additional data on the effects of weather on smoke clouds.

38. Effects of Wind

The movement of smoke depends upon the speed and direction of the wind. Wind direction and speed are important factors in estimating the amount of smoke-producing equipment needed and the requirements for munitions and fog oil for a smoke operation. To provide an effective smoke screen over a selected area, the smoke control officer must be able to apply weather data to the smoke operations.

a. Wind Speed. The prevailing wind speed is an important factor in determining how far the smoke-producing equipment should be placed from the area to be screened. Wind speeds ranging from 4 to 10 knots are ideal for the production of smoke screens. At other wind speeds, difficulties are encountered and more generators or pots may be necessary to establish and maintain an effective smoke screen.

b. Wind Direction. The direction from which the wind blows is called the wind direction. The direction of the wind determines the location of the smoke line to cover the selected area effectively. In smoke operations the terms used to designate wind direction are: headwind, following wind, flank wind, and quartering wind. For an explanation of these terms see figure 8. Munition expenditures are smallest with flanking winds, greater with oblique or quartering winds, and greatest with head or following winds.

39. Effects of Temperature Gradient

An estimate of temperature gradient conditions is used to predict the stability of the air. Temperature gradients are measured by subtracting the air temperature 0.5 meter above the ground surface from the air temperature 4.0 meters above the ground surface. With logistical limitations, smoke can be produced under any temperature gradient condition (fig.

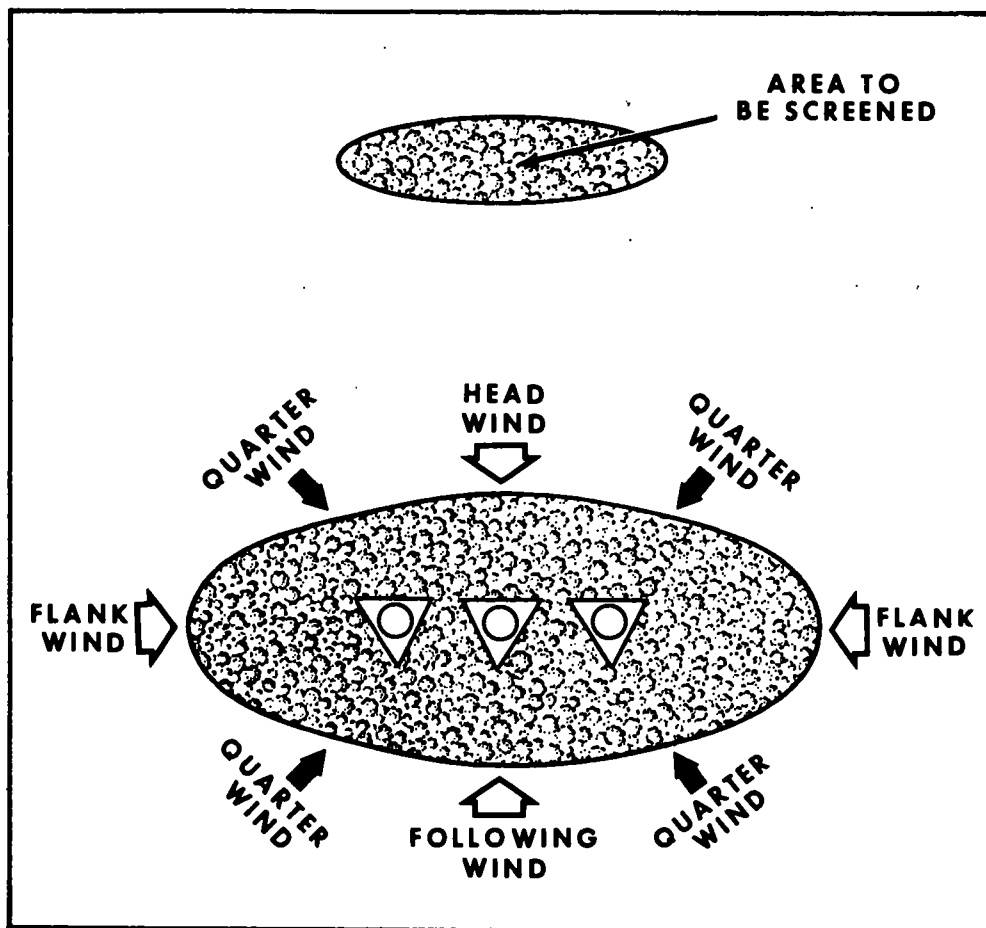


Figure 8. Method of designating wind direction.

9). The temperature gradient conditions are expressed as follows:

a. Lapse. A lapse condition exists when there is a decrease in temperature with an increase in height above the ground. The air is unstable with much air turbulence. During lapse conditions, smoke tends to rise and diffuse rapidly. Lapse conditions are favorable for the production of smoke curtains.

b. Inversion. An inversion condition exists when there is an increase in temperature with an increase in height above the ground. During inversion conditions, smoke spreads and diffuses slowly. Inversion conditions are favorable for the production of a smoke haze or a smoke blanket screen.

c. Neutral. During neutral conditions, the

characteristics of the smoke screen vary between those of lapse and inversion conditions. A neutral condition tending toward lapse is good for the production of smoke curtains. When neutral conditions tend toward inversion, a smoke blanket screen may be produced.

40. Effects of Humidity and Precipitation

Humidity only slightly affects smoke screens generated by smoke generators. In high humidity HC smoke pots generate more effective smoke screens and produce denser concentrations than in low humidity. Light rains decrease visibility; therefore, less smoke is needed for concealment. Heavy rains and snow so reduce visibility that the use of smoke is rarely necessary to provide concealment.



Figure 9. Effect of temperature gradient conditions on smoke.

Section IV. EMPLOYMENT OF SMOKE GENERATORS AND SMOKE POTS

44. General

Smoke screens normally are produced by mechanical smoke generators supplemented by smoke pots. These generators and pots are emplaced around the area to be screened which is called the selected area. They are positioned so as to give 360° coverage of the selected area. Communications are established so as to enable the generators to be maneuvered quickly into new positions to correct deficiencies in the smoke screen caused by changes in meteorological conditions.

45. Selection of Smoke Positions

To provide an effective coverage of a design-

41. Effects of Temperature

Temperature has no significant effect on smoke screens generated by HC smoke pots. At temperatures above 80°F., smoke screens generated by mechanical smoke generators are dissipated more rapidly than they are at lower temperatures. For smoke operations in cold weather areas, see paragraph 109.

42. Effects of Cloud Cover

When the sky is covered with clouds, the atmosphere is moderately stable and conditions are generally favorable for producing smoke. As the amount of cloud cover decreases during the day, lapse conditions develop; as the amount of cloud cover decreases during the night, inversion conditions develop.

43. Effects of Terrain

Since smoke is carried by the wind, it normally follows the contours of the earth's surface. On flat, unbroken terrain and over water, smoke streamers take longer to spread out and mix with other streamers. Obstructions on the earth's surface (such as trees and small buildings) tend to break up smoke streamers, causing them to re-form and cover a larger area and to create a more uniform screen. Large hill masses and very rugged terrain cause strong cross currents which disperse smoke excessively and create holes and unevenness in the smoke screen.

nated area, generator positions must be selected to provide 360° coverage. The positions are selected after planning and reconnaissance have taken place (para 50-61). To obtain the most thorough coverage, two smoke generator lines may be set up as an inner and an outer ring around the area to be screened (fig. 10). The smoke line is a hypothetical line on the ground along which smoke generator positions and smoke pot positions are located. Because of variations in terrain configurations, the smoke line is not necessarily straight or uniformly curved around the selected area to be screened. The purpose of the inner ring is to provide a quick-cover screen for the selected area. Smoke pots usually are used for the inner ring because

they can be ignited mechanically or electrically and can establish a screen quicker than generators. Generators are used in the outer ring and may also be used in the inner ring if time permits. Both rings are used when it is necessary to provide the most complete coverage in the shortest possible time. See table I for information on spacing of M3-series mechanical smoke generators and table II for information on spacing of smoke pots.

Table I. Spacing Guide for M3-series Mechanical Smoke Generator

Type of terrain	Generator spacing (in meters) at wind speeds of: ^{1 2 3}		
	1-7 knots ^{4 5} (1-13 kmph)	8-13 knots (15-24 kmph)	14-17 knots (26-32 kmph)
UNDER LAPSE CONDITIONS ⁶			
Over Water -----	35	25	20
Open Terrain -----	45	35	25
Woods -----	65	55	45
UNDER INVERSION AND NEUTRAL CONDITIONS ⁶			
Over Water -----	45	35	25
Open Terrain -----	55	45	35
Woods -----	70	65	55

¹ Spacings given are for a line of generators normal (perpendicular) to the wind direction.

² The distance between the near edge of the target and the smoke generator line should be at least ten times the spacing between generators.

³ Spacings given are for producing smoke blankets. This spacing guide may be used for producing obscuring smoke on the enemy under favorable weather conditions (see para 98). For establishing smoke hazes, spacings twice those indicated in the table can be used and generators should be placed five times the distance between generators from the near edge of the target.

⁴ When wind speed is very low, water-based generators may have to be worked back and forth along the line.

⁵ See appendix F for conversion scale.

⁶ See paragraph 39 for explanation of temperature gradient conditions.

Table II. Spacing Guide for Smoke Pots

Type of terrain	Smoke pot ¹ spacing (in meters) at wind speeds of: ^{2 3 4}		
	1-7 knots (1-13 kmph)	8-13 knots (15-24 kmph)	14-17 knots (26-32 kmph)
UNDER LAPSE CONDITIONS ⁵			
Over Water -----	25	20	15
Open Terrain -----	25	20	15
Woods -----	30	25	20
UNDER INVERSION AND NEUTRAL CONDITIONS ⁵			
Over Water -----	25	20	15
Open Terrain -----	25	20	15
Woods -----	35	25	20

¹ Type smoke pots are: AN-M7 and AN-M7A1 SGF2 floating smoke pots, M4A2 HC floating smoke pots, and ABC-M5 HC smoke pots.

² Spacings given are for a line of smoke pots normal (perpendicular) to the wind direction.

³ The distance between the near edge of the target and the smoke pots should be at least ten times the spacing between smoke pots.

⁴ Spacings given are for producing smoke blankets. For establishing smoke hazes, spacings twice those indicated in the table can be used, and smoke pots should be placed five times the distance between generators from the near edge of the target.

⁵ See paragraph 39 for an explanation of temperature gradient conditions.

⁶ Note. Spacings for M1 HC smoke pots must be determined by trial in the field.

46. Emplacement and Operation of Generators

Generators may be emplaced on land or on boats. Refer to the appropriate technical manual for operating instructions.

a. *On Land.* Generators are dug in whenever possible; they may be located in structures. The emplacement for a generator (fig. 11) should be no larger than necessary to hold the generator, oil drum, and gasoline supply and to allow the operator room to perform maintenance when required. The operator's foxhole should be located about 25-30 meters away in combat areas. Revetments should be constructed around the position if the soil is loose or if high blast pressure resistance is desirable. No part of the equipment should extend above the surface of the ground. If time permits, the generator should be emplaced deep enough to allow construction of overhead cover strong enough to stop shell fragments. The cover should not extend above the surface of the ground. Holes for venting smoke and engine exhaust must be provided. Smoke pots are emplaced to screen generator positions. In extended operations alternate positions are prepared for each generator.

b. *On Boats.* Generators on boats can be concealed behind a smoke screen made by floating smoke pots dropped by fast-moving boats.

47. Emplacement and Operation of Smoke Pots

Smoke pot emplacements should be dug in whenever possible, and the pots should be burned in an inverted position to conceal their glare. Bricks, or similar material, should be put in the bottom of the emplacement so that the smoke pots can burn freely. If smoke pots are not dug in it may be necessary to use flame shields around individual pots to hide their

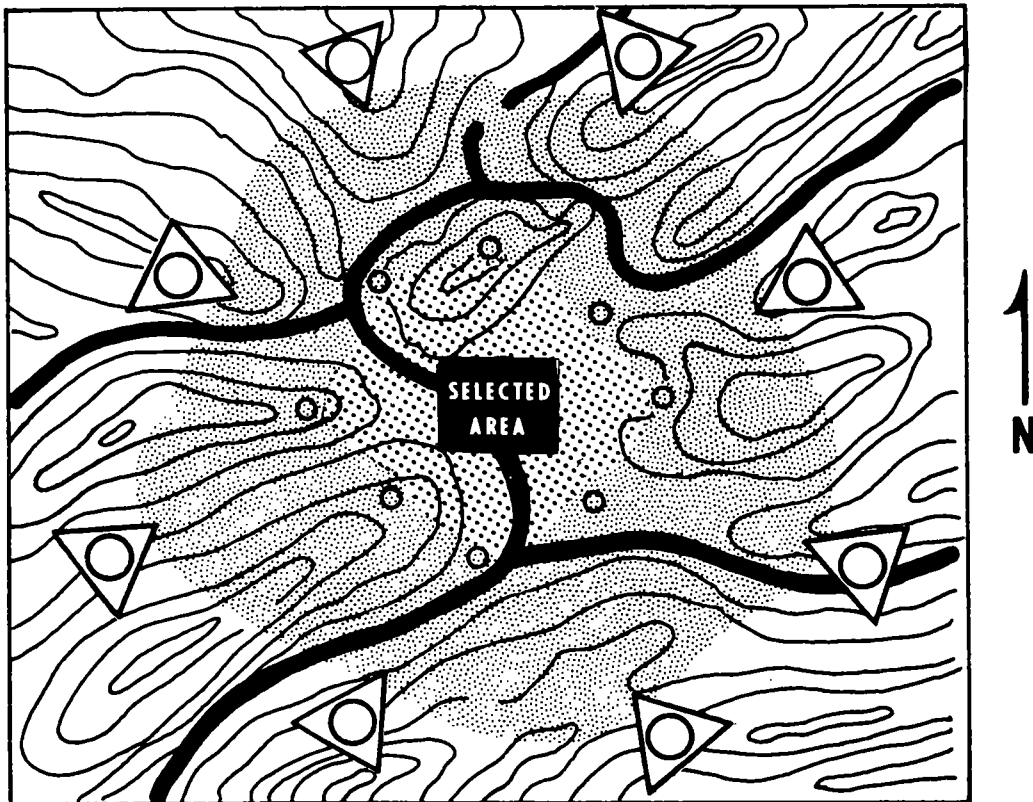


Figure 10. Designation of smoke positions.



Figure 11. Emplacement for smoke generator.

glare from the enemy. Flame shields can be improvised from scrap iron, pottery, or from oil drums with the ends removed. When a screen of long duration is desired, pots can be placed end to end in a trench, or they can be stacked. The heat from one pot ignites the adjoining pot,

thus providing a long-burning chain (fig. 12). Smoke pots can be ignited also by remote control electrical firing. The electrical wiring should be dug into the ground to protect it from shell fragments and other hazards. See TB CML 100 for operating instructions.

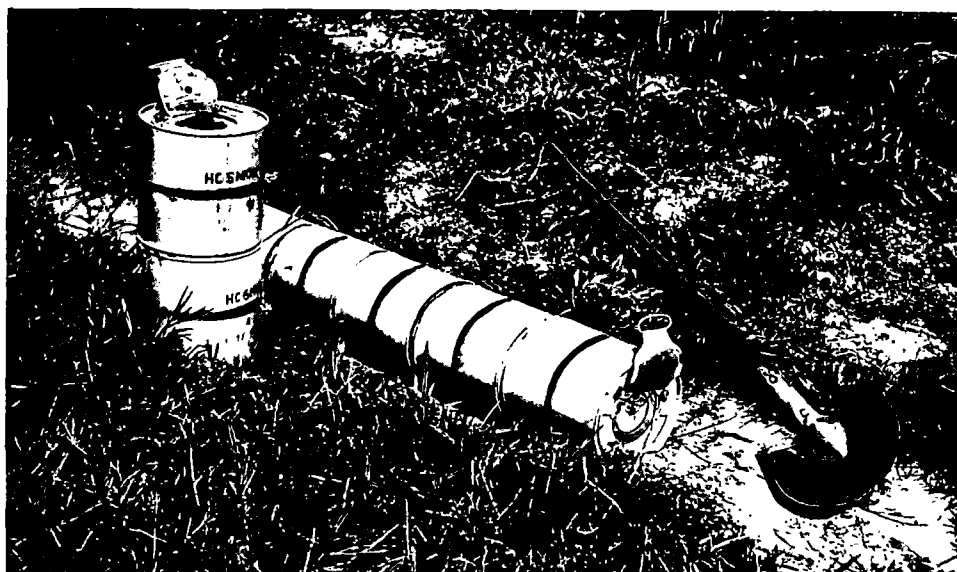


Figure 12. Long-burning chain of smoke pots.

CHAPTER 5

FIELD OPERATIONS

Section I. PLANNING

48. Responsibilities of Supported Unit Commander

The commander being supported by the chemical smoke generator unit is responsible for the overall operation. He assigns and defines the smoke mission, and is responsible for coordinating the smoke operation with all units participating in or affected by the operation. He indicates the nature of the smoke plan to be prepared by the smoke unit commander and the time and place it is to be submitted for approval. He is responsible for initiating and stopping the smoke operations.

49. Responsibilities of Smoke Unit Commander

The smoke unit commander is responsible for all activities pertaining to establishing and maintaining the smoke screen. He makes a reconnaissance of the designated area (para 55 and 56) and prepares a smoke plan, usually an overlay of the area showing the general locations of the generator positions (fig. 10). This plan is submitted to the supported unit commander for approval. An important factor to be considered in preparing a plan for screening a selected area is the time available in which to establish the smoke screen. In forward area situations, the smoke screen may be established before daybreak and may continue during daylight hours until night.

a. The following factors could affect the plan for screening an installation:

- (1) The vulnerability of the selected area to enemy observation, mortar, artillery, missile, or rocket fire or air attack.
- (2) The efficiency of the friendly air-raid warning system.
- (3) The weather and terrain conditions.

b. A smoke plan covers the following:

- (1) Selection and designation of the smoke lines.
- (2) Supply and maintenance of the smoke installations.
- (3) Control of smoke operations.
- (4) Communications.
- (5) Security.
- (6) Intelligence (meteorological data).
- (7) Liaison.
- (8) Road nets.

50. Planning Considerations

Planning for smoke missions normally will begin with the commander of the supported unit, or with the smoke unit commander assigned to support the unit. The smoke unit commander and his subordinate leaders prepare a detailed plan (app B), and the smoke unit commander forwards this plan to the G3/S3 for approval; the G3 forwards this plan to the supported unit commander for final approval. To meet his requirements, the smoke unit commander obtains the following information from the supported unit commander: the type of smoke mission, location of the area to be screened, time to make smoke, duration of the smoke operation, and immediate support available to the smoke unit. Based on this information, the smoke unit commander plans a map, a ground, and, if possible, an air reconnaissance and initiates action to obtain and evaluate other necessary information that will affect the accomplishment of his mission. This additional information pertains to weather, terrain, supply, operational requirements, and effects of enemy action. The smoke unit commander must also plan the establishment of liaison, communications, and medical aid.

51. Planning Supply and Operational Requirements

During the planning phase, the smoke unit commander determines his requirements for supplies, equipment, and personnel to insure effectiveness of his unit during operations.

a. Supply Requirements. In planning his supply requirements, the commander must consider that the operation may last for the maximum time and that the most unfavorable weather may prevail. He must determine what type and how many smoke generators and vehicles will be required to accomplish his mission. In prolonged operations, some of the equipment may be forced out of action by normal wear and tear and by enemy action. If this equipment cannot be repaired by the unit mechanics, it must be exchanged at the supply installations. Plans must be made for the resupply of this equipment to insure continuous smoke operations.

b. Operational Requirements. In developing his plan, the smoke unit commander determines his operational requirements that can be furnished by the supported unit. Such support may include additional or special communications equipment; transportation; control of the units supporting the smoke operations; special equipment, such as boats, barges, and fixed or rotary wing aircraft for observation of the smoke screen or for transportation in rough terrain; medical support; periodic weather information; intelligence of enemy activities; and bivouac and forward assembly areas.

52. Planning and Liaison

The smoke unit commander plans for early liaison with the supported unit to discuss problems in connection with the operation. The smoke unit commander is a source of information for the commander of the supported unit. Whenever possible the smoke unit com-

mander makes personal contact with the supporting, and adjacent units to conduct reconnaissance, insure selection of primary and secondary smoke position, and coordinate communications nets. Liaison with other chemical units in the general area may also be helpful.

53. Planning for Communications

In planning communications for a smoke operation, the smoke unit commander coordinates with the supported unit or with the signal officer of the supported unit to determine what plans exist for his unit's communications and to insure that they are adequate. The smoke unit must establish communications with the supported unit and enter the communications system of the supported unit at the nearest communications facility. The smoke unit commander obtains current SOI and SSI items that apply to his unit for each operation. These instructions are obtained as early as possible to permit necessary changing of radio frequencies and familiarization with radio call signs and telephone directory names of units. As soon as he is informed of his mission, the smoke unit commander makes, or causes to be made a map reconnaissance and a tentative communications plan to include location of switchboards and radio positions. His ground reconnaissance includes communications reconnaissance. With the assistance of his communications personnel, the smoke unit commander prepares a plan for signal communications. This information is included in paragraph 5 of the unit operation order.

54. Planning Medical Support

The smoke unit commander makes arrangements for medical support from the supported unit or from the unit providing combat service support. For large-scale operations involving the smoke battalion, the battalion commander may request a medical aid station for the support of his unit.

Section II. RECONNAISSANCE AND SELECTION OF POSITIONS

55. Planning the Reconnaissance

In order to complete his estimate of the situation, the smoke unit commander seeks information concerning the terrain, weather, and

friendly and enemy troops, which can affect the accomplishment of his mission. Some of this information can be obtained from higher or supported units, from map reconnaissance, and

from his unit's air and ground reconnaissance. Whenever possible a ground reconnaissance of the area of operations is conducted. The smoke unit commander plans his reconnaissance to make careful use of time so as to allow his subordinate commanders the maximum time for preparation of their plans after the issuance of his orders. The commander makes a map reconnaissance to study the prominent terrain features and obtain information needed in preparing the tactical plan or maneuver.

a. Mission. The mission of the reconnaissance is to obtain, by visual observation or other detection methods, data concerning the meteorological and geographical characteristics of the area. Some situations may require a special reconnaissance assignment and the utilization of more than one reconnaissance party to accomplish the required results.

b. Reconnaissance Party. The commander includes those personnel he desires in his reconnaissance party. Normally, this includes the operations officer, security personnel, and messengers. It often includes representatives from the supported unit. When pressed for time, the battalion commander may request his company commanders to accompany him on all or part of his personal reconnaissance. The size of the reconnaissance party may be limited because of factors such as restrictions placed on movement.

56. Reconnaissance Objectives

The reconnaissance conducted, or directed, by the smoke unit commander provides him with the information required for the formulation of his smoke plan. Therefore, the reconnaissance is as complete as the time and the situation allow. After completing his reconnaissance, the commander utilizes information from all sources and completes his estimate of the situation and his smoke plan. The objectives of reconnaissance are to—

a. Locate Selected Area. The area to be screened is located to determine the extent of the smoke screen required.

b. Determine Subordinate Unit Positions. Based on the selected area and existing terrain and weather conditions, the smoke unit com-

mander selects and designates areas of responsibility for subordinate units (para 57).

c. Select and Designate Smoke Lines. Based on spacing requirements for generators, the smoke commander designates the general location and length of the smoke lines; the smoke lines may be inner and outer rings around the area to be screened (para 45).

d. Locate Communications Positions. The nearest signal center or communications facility of the area system of the supported unit must be located in order to facilitate a convenient entry into this system. Suitable sites are selected for radio installations (para 59).

e. Locate Control Points. Sites are selected for smoke control points and observation posts (para 60).

f. Locate and Designate Supply Routes and Access Areas. Routes and access areas are selected and designated for supply of smoke generator positions.

g. Determine Local Weather Peculiarities. The area is studied to determine local weather peculiarities, such as unusual wind currents, lengthy neutral and inversion conditions, and tendency of the air to stabilize in layers, and other conditions that may have a significant effect on the positioning of smoke generators.

h. Determine Security and Defense Requirements. The vulnerability of the area to enemy action is studied to assist in the development of defense plans. The terrain is studied for positions that offer good cover and concealment (para 61).

57. Subordinate Unit Positions

The area to be screened is divided into appropriate sectors to provide for area coverage regardless of the direction of the wind. Subordinate units may be assigned to cover each sector around the area, or they may be assigned to cover those sectors perpendicular to the direction of the prevailing wind. Some units may be designated as a reserve.

a. Overlay Diagram. An overlay diagram (fig. 13) of the area and the sector divisions is prepared and issued to subordinate units. The number of sectors varies with the number of

subordinate units and the extent of the area to be covered. An operation overlay (fig. 14) is then prepared which reflects the location of individual generators, as well as command and logistical elements of the smoke installation. This overlay is kept at the smoke control point for use by the smoke control officer; it aids him in directing the shifting of generators. The operation overlay is used in conjunction with the firing diagram (para 58).

b. Movement of Subordinate Units From Sector to Sector. If the direction of the wind shifts and a subordinate unit is directed to

move to cover a new sector, the overlay is used to designate new positions. For example, during deployment of the platoons of a smoke company, the line formed by the direction of the wind to the target area is used as the dividing line of platoon areas of responsibility.

58. Deployment of Smoke Generator Company

The deployment of the smoke generator company is made in accordance with sector assignments based on the current weather information and on a firing diagram. The firing diagram

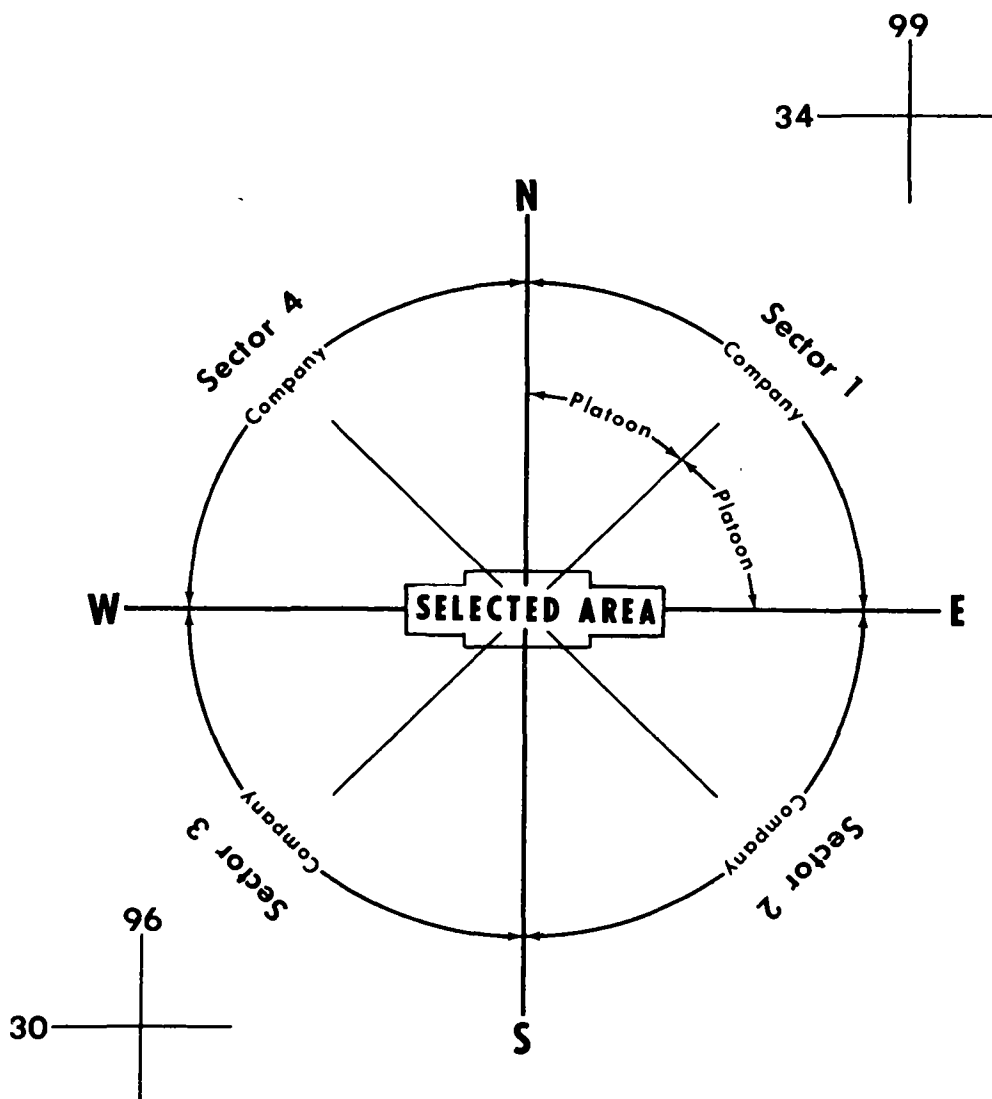
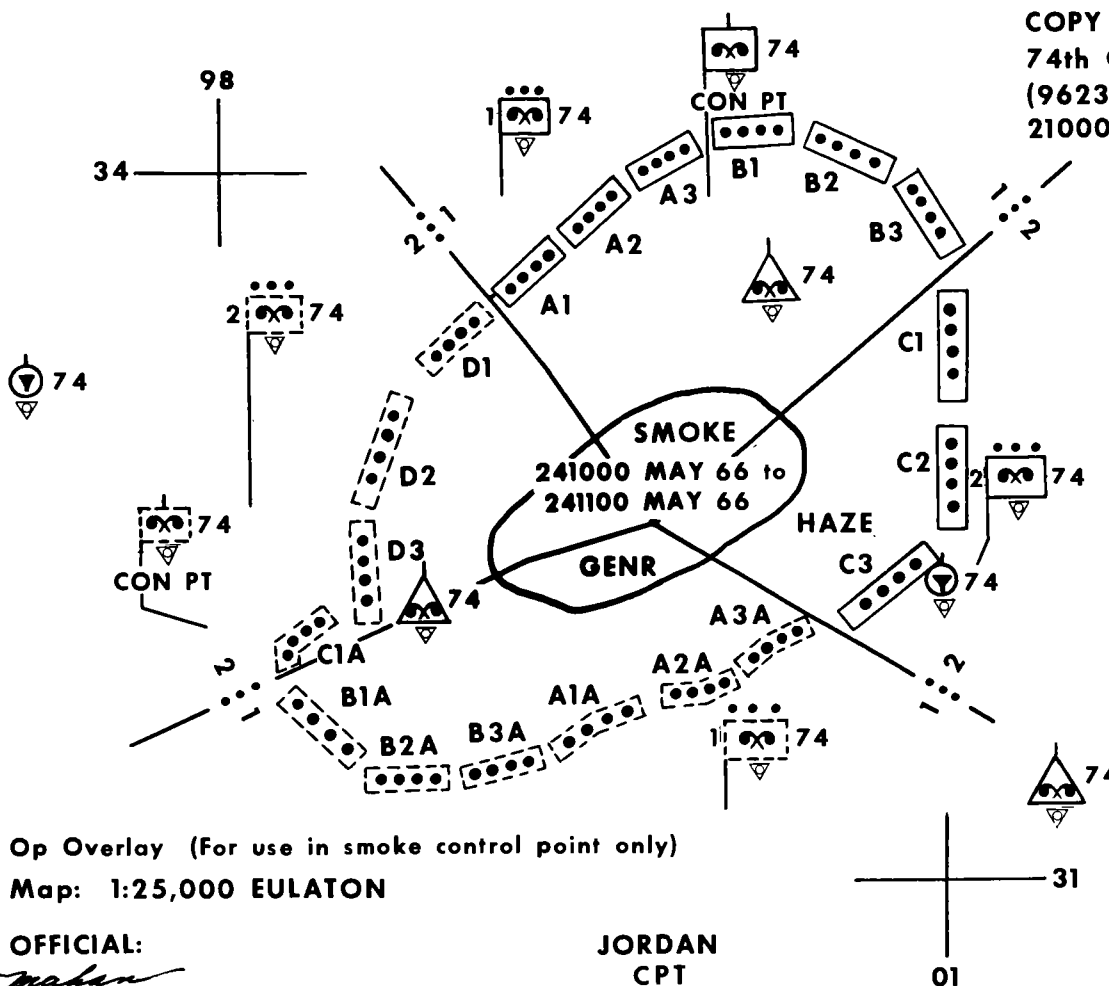


Figure 13. Example overlay showing designation of sector assignments.

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(962337) EULATON
210001 May 66



Op Overlay (For use in smoke control point only)

Map: 1:25,000 EULATON

OFFICIAL:

MAHAN

MAHAN

Op O

Note. A-B-C-D-lettered blocks are smoke generator sections composed of four smoke generators each.

Figure 14. Example operation overlay.

for the smoke company (fig. 15) shows the selected area divided into eight sectors. The diagram is used primarily by the smoke control officer to indicate the direction of the wind and the area to be occupied by the operating platoons. During deployment of the operating platoons, the line formed by the direction of the wind to the target area is used as the dividing line of platoon areas of responsibility. As the wind shifts, the smoke control officer determines the movement of the platoon according to the firing diagram.

59. Communications

The communications net control station (NCS) is located at the smoke control point. Reconnaissance is required to select wire routes, switchboard locations, and locations for radio sets. A line route map is prepared by the signal officer or communications chief to speed installation of wire nets. Radio sets should be located in positions that will afford protection from direct enemy fires and will provide a relatively unobstructed path in the directions of transmis-

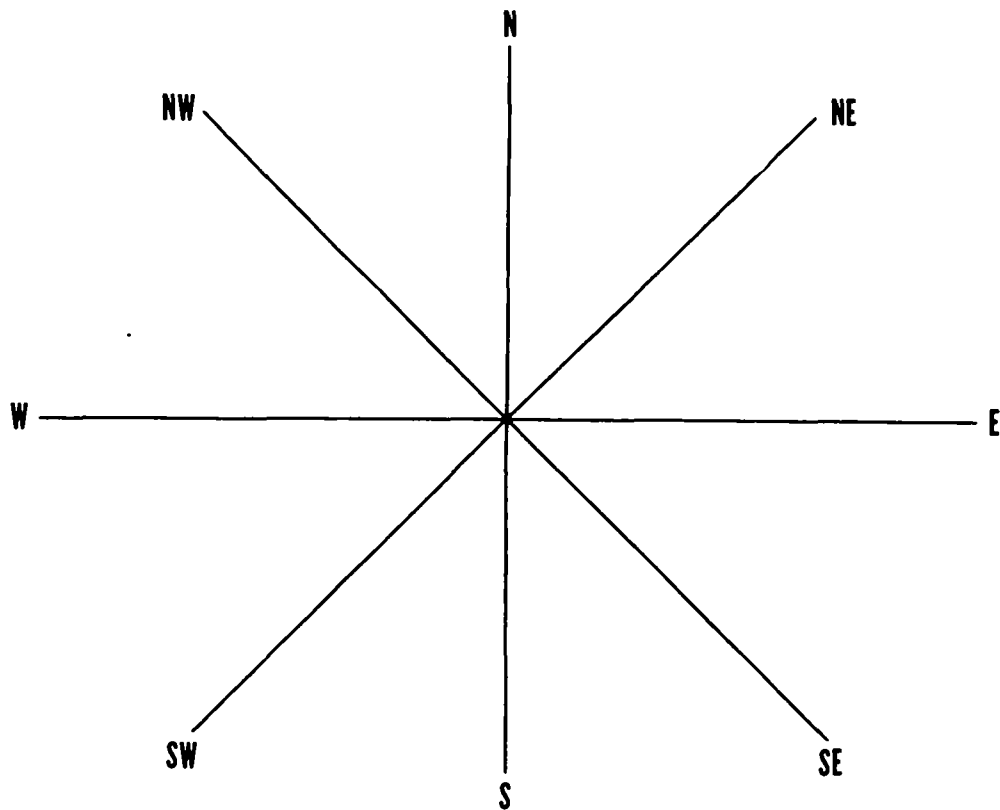


Figure 15. Firing diagram.

sion. When terrain features prevent the selection of optimum locations, it must be borne in mind that effective communications receive priority consideration in selection of locations. The smoke unit's communications net should link the following:

- a. Smoke generator squads with the smoke control point.
- b. Smoke control point with the supported unit through its communication system.
- c. Smoke generator unit with the nearest Air Weather Service unit (through the area communications system).
- d. The smoke unit command post with the warning system net of the supported unit.

60. Control Sites

Sites are selected for the smoke unit command post, bivouac area, supply point, and ob-

servation posts. Existing observation posts already established by infantry and artillery units are usually adequate for the ground observation requirements of the smoke unit. However, coordination with the supported unit for the use of aircraft for aerial observation may be necessary.

61. Security and Defense

During his reconnaissance, the smoke unit commander considers the possibilities of organization for the defense of the smoke line. De-filaded and wooded areas offer good cover and concealment. The location of such areas should be noted as possible generator sites, and the information is passed on to subordinate commanders for their use. The location of friendly forces and installations in the area should be noted for possible assistance in mutual defense planning.

Section III. MOVEMENT INTO AND OCCUPATION OF POSITIONS

62. Tactical Movements

Tactical movements are made under combat conditions within an active theater of operations when early enemy action is possible by ground forces or by air forces. Tactical movements may be made on ground, in the air, or on water. During ground movements in the combat zone, the smoke unit must be prepared for enemy air or ground action, including attacks utilizing mass destruction and mass casualty weapons. Many of the techniques used in administrative movements (para 138), modified to meet security requirements, apply to tactical movements. In tactical movements, accomplishment of the mission is of primary importance. The possibility of enemy air or ground attack may affect the commander's decision to complete the movement of his unit with maximum speed and minimum fatigue. Tactical movements are generally accomplished by—

a. Infiltration. Infiltration is accomplished by the dispatch of individual vehicles or small groups of vehicles over a specified route at irregular intervals to give the appearance of casual traffic. This type movement is used to provide maximum security, deception, and dispersion as a means of passive defense against enemy observation and attack. It is therefore well suited to daylight marches. In order to prevent individual vehicles from getting lost, each driver is informed of the route. In addition, it may be necessary to mark the route.

b. Open Column. Open column is applicable for daylight moves and for moving on routes when a moderate volume of higher or lower speed traffic may have to enter the column. In an open column, elements of the march unit are widely spaced to provide a means of passive defense and to minimize the effects of dusty road conditions.

c. Closed Column. In a closed column, the vehicles follow at the minimum distance which safety, traffic conditions, and the tactical situation permit. The closed column does not provide dispersion for passive defense against enemy observation and attack. Closed column is employed when the road net must be utilized to the maximum capacity and is also employed for night moves under blackout conditions.

63. Security and Control During Movement

During movement of the smoke unit in an operational area, the smoke unit commander is responsible for establishing security elements to prevent an enemy force from surprising or ambushing the column. When the smoke unit cannot enter (or withdraw) from an operational area because of the enemy situation, protection escort may be requested from the supported unit.

a. Organic Security. During movement to new positions, it may be necessary for the smoke unit commander to send out security detachments to the front, flanks, and rear of the column. Security detachments operate sufficiently to the front and rear to prevent an enemy from ambushing or surprising the column. Within the column, one individual per vehicle is appointed as air guard and one as a ground guard. Alerts of an approaching enemy attack must be spread immediately throughout the column, and the convoy commander must be informed as quickly as possible. Alert procedures and formations for combat are covered in the unit SOP.

b. Control. Road clearance is coordinated and obtained by the smoke unit commander through the unit to which it is assigned or attached. Positive control of the entire unit during movement into the operational area depends upon sound planning and adequate communication. All of the unit's communication facilities allowed by security requirements are utilized to assist in maintaining control.

64. Assembly Areas

The assembly area is in an area in which elements of a smoke unit assemble and prepare for further tactical action.

a. Selection of Assembly Area. The following factors should be considered in selection of an assembly area:

- (1) Cover and concealment from hostile air and ground observation.
- (2) Sufficient space for dispersal of unit personnel and equipment.
- (3) Suitable routes of entrance and exit.

- (4) Turn-around and firm, well-drained ground suitable for parking vehicles.
- (5) Natural obstacles for protection against enemy armor.
- (6) Location as close to the current positions as the terrain and enemy activity permit.

b. Security. The smoke unit commander coordinates security measures to insure that his command is not surprised by enemy patrols or infiltrators. Air defense security measures are taken, and antitank weapons are positioned to provide protection against surprise armored attacks.

c. Preparation for Mission. In the assembly area, final preparation for the mission is completed to the fullest possible extent. While the smoke unit is in the assembly area, reconnaissance is completed, plans are formulated, and orders are issued.

65. Night Movements

Night motor movements may consist of tactical motor marches and resupply activities during sustained combat operations. Night movements have definite advantages over day movements, because they provide concealment from enemy observation and provide some security from air attacks. Night movements generally are organized and conducted in the manner as daylight movements. However, lack of visibility creates special problems in maintaining control; this requires careful preparation and special measures that vary according to the degree of visibility. Special measures include reduced distances between elements, reduced speed, careful prior reconnaissance of routes and the area to be occupied, knowledge of prominent landmarks, use of guides, and route markers. The smoke unit commander is responsible for maintaining control, direction, and communications within the column.

66. Movement into and Occupation of Positions

Before a unit moves into and occupies a position, some preliminary work can be done to make the movement efficient. Key personnel and equipment can be moved first to prevent

congestion. Work to be accomplished may include the following:

a. Preliminary Work at Site. It may be necessary to take security measures, such as posting guards to protect the site from sabotage or from other enemy action. If the site is in an area previously controlled by the enemy, it may be necessary for a radiological monitoring and survey team to monitor for contamination, and a chemical agent detection and identification team to determine if the area is free of chemical agents. Roads can be laid out and marked with signs. If the area is to be occupied at night, it may be desirable to post suitable visible signs as landmarks.

b. Movement Into Positions. A unit moving into action in a situation where time is important is normally contacted initially by messenger or coded radio and directed to move forward to a designated control point to arrive at a given time. Personnel from the commander's party should meet subordinate units at this point and should guide them to their respective positions. There should be no halt or delay at this point.

c. Occupation of Positions. Immediately after arrival at positions, all elements of the smoke unit prepare for action. The smoke unit commander is notified as soon as subordinate units are ready to make smoke. The fuel supply section unloads fog oil at each generator position immediately after its occupation. All elements of the smoke unit continue to improve their positions until they receive a warning order to displace.

67. Defense of Positions

The smoke unit defense plans, including measures to be taken in defense against enemy attack, are integrated with the defense plans of the supported unit. However, situations may require the smoke unit, or a subordinate element to defend itself.

a. Active Defensive Measures. A guard system and the use of obstacles are included in the active defensive measures to prevent penetration of the smoke generator position by the enemy. Refer to FM 3-10, FM 5-15, FM 7-20,

FM 20-32, and FM 20-33 for detailed information.

- (1) Sentries may be stationed at outposts to cover road junctions and natural approaches to the smoke installation.
- (2) Natural obstacles may be utilized and supplemented by artificial obstacles, such as barbed wire, traps, mines, and field expedients. Tripwires and the use of flame field expedients give warning of the approach of the enemy at night (see FM 20-33).
- (3) When required by the tactical situation, a combat element may be organized and trained to provide mobile security against enemy guerrilla and partisan attack.

b. Passive Defensive Measures. Deception, dispersion, concealment, and protection are the passive defensive measures that minimize the effects of an enemy attack. Information on the

construction of foxholes and hasty field fortifications for individual protection is given in FM 21-75. The recommended fortification for the generator operator is the one-man foxhole. Such an emplacement will give the operator protection against blast, initial radiation, fallout, and conventional weapons effects and will provide him with relief from extended periods in the generator emplacement. This foxhole should be located close to the generator.

c. Defense Against CBR Attack. Refer to FM 21-40 for information on defense against CBR attack.

d. Destruction of Equipment. Tactical situations may arise in which it is impossible to evacuate equipment. All material that cannot be evacuated with the unit must be destroyed. Destruction of material is accomplished when directed by higher headquarters. (Refer to the appropriate technical manuals for information on destruction of equipment.)

Section IV. EMPLOYMENT OF NON-AIR DEFENSE WEAPONS AGAINST AIRCRAFT

68. Purpose

The purpose of this section is to—

a. Recognize the threat of enemy airmobile operations, close-air support, interdiction aircraft, and air reconnaissance against any unit in a combat theater.

b. Recognize the potential effect of a large volume of small arms fire that can be furnished by organic weapons against low flying hostile aircraft.

c. Reflect the necessity of commanders establishing detailed SOP for the identification and engagement of hostile aircraft to include how identification is accomplished, which personnel will fire, techniques of fire to be used, rules of engagement and controls to be exercised.

d. Reflect the necessity for training individual soldiers in aircraft identification, techniques of firing at aerial targets and response to control methods.

e. Emphasize the aggressive engagement of hostile aircraft with organic weapons as specified in carefully prepared SOP and rules of engagement.

f. Recognize the threat to friendly aircraft in failure to discriminate between hostile and friendly aircraft.

g. Place in proper perspective the tactic of withholding fire to preclude disclosure of positions.

69. Concept

a. The substantial low altitude air threat faced by units in the combat theater may be partially countered by aggressive use of the large volume of fire which non-air defense weapons can place against this threat.

b. Exercise of the individual and collective right of self-defense against hostile aircraft must be emphasized. Hostile aircraft include all attacking aircraft and those positively identified enemy aircraft which pose a threat to the unit. The requirement for exercise of this right has not been adequately emphasized in the past. Large volumes of fire from non-air defense weapons have proven capable of destroying both high and low speed aircraft or disrupting their attack. Exercise of this right does not demand specialized use of communications and is inde-

pendent of theater air defense rules for engagement and air defense control procedures.

c. Indiscriminate use of non-air defense weapons must be prevented due to the resulting danger to friendly aircraft and troops and the requirement to place in proper perspective the technique of withholding fire to preclude disclosure of positions. Effective and safe employment of these weapons necessitates Army-wide training expenditures. Engagement of hostile aircraft in immediate self-defense will be most frequent and training emphasis should reflect this.

d. Situations may arise wherein the exercise of the right of self-defense should be temporarily suppressed, or when freer use of non-air defense weapons against aircraft should be encouraged. The former case involves a local decision that prevention of position disclosure is paramount. Notice of such restriction is disseminated through command channels. The latter case should be based on a theater-level decision.

e. Use of a single rule for engagement: "Engage hostile aircraft" is based on the knowledge that common sense interpretations of the rule will be correct. For example, all aircraft attacking the unit and enemy aircraft performing operations such as forward air control, reconnaissance, surveillance, or dropping landing troops are clearly "hostile aircraft."

70. Rule of Engagement

In the absence of orders to the contrary, individual weapon operators will engage attacking aircraft; engagement of all other hostile aircraft will be on orders issued through the unit chain of command and will be supervised by unit leaders. Nothing in this rule is to be taken as requiring actions prejudicial to accomplishment of the primary mission of the unit.

71. Techniques

The following techniques should maximize the destructive and/or deterrent effect against aircraft. Aircraft may be divided into two categories; low speed and high speed. Low speed aircraft include helicopters and liaison, reconnaissance, and observation fixed wing propeller aircraft and all jet fixed wing aircraft. This

distinction will result in simplified engagement procedures.

a. *Engagement of Low Speed Aircraft.* In accordance with the rule for engagement, engage low speed enemy aircraft with aimed fire, employing the maximum weapon rate of fire.

b. *Engagement of High Speed Aircraft.* In accordance with the rule of engagement, engage high speed enemy aircraft with maximum fire aimed well in front of the aircraft, and above its flight path, in order to force it to fly through a pattern of fire. This technique is not unaimed "barrage" fire, but requires a degree of aimed fire. It does not, however, call for careful estimation of aircraft speed and required lead.

c. *Use of Tracer Ammunition.* Automatic weapons should utilize the highest practical proportion of tracer ammunition to enhance the deterrent or disruptive effect.

d. *Massed Fire.* Units should employ a massed fire technique when using small arms and automatic weapons in an air defense role.

72. SOP Items

Company-level SOP should cover, but not be limited to, the following items relevant to engagement of aircraft with non-air defense weapons:

a. *Applicability.* Designate weapons operators concerned.

b. *Relation to Primary Mission.* The primary mission is never prejudiced.

c. *Relation to Passive Air Defense.* The necessity for aggressively engaging hostile aircraft is balanced with the requirement to place in proper perspective the tactic of withholding fire to prevent disclosure of position.

d. *Authority to Engage.* Authority to engage attacking aircraft delegated to individual weapons operators and to engage all other hostile aircraft on orders through unit chain of command, subject to the rule for engagement and rules for withholding fire.

e. *Rule for Engagement.* Normally self-defense only against all attacking aircraft and

those positively identified enemy aircraft which pose a threat to the unit.

f. Rules for Withholding Fire. When ordered. When not positive that aircraft are actually attacking or otherwise hostile. When friendly aircraft or troops are endangered.

g. Position Selection. Applicable only to weapons specifically assigned an air defense

role; e.g., designated single barrel caliber .50 machineguns. See FM 44-1.

h. Firing Techniques. Lead and superelevation. Massed fire. Maximum use of tracer ammunition.

i. Unit Training Requirements. Motivation and discipline. Gunnery. Aircraft recognition.

Section V. SMOKE OPERATIONS IN THE COMBAT ZONE

73. General

The combat zone is that area required by combat forces for the conduct of operations and is normally within range of enemy observed ground fire and is subject to tactical air attack. Based on current tactical doctrine, smoke screens can effectively interfere with enemy deployment of observed ground-to-ground weapons and observed air-to-ground weapons. Current tactical doctrine calls for the use of highly mobile combat forces with massive supporting firepower and with the ability to disperse and mass rapidly for the attack. These forces seek to gain surprise and to preserve secrecy during maneuver by the use of cover, concealment, and deception. The mobile force commander uses smoke to conceal his unit's movements and to deceive the enemy of his intentions.

74. Types of Missions

Chemical smoke generator units are normally employed to conceal troops, operations, and installations and to deceive the enemy through the use of smoke.

a. Large-Area Smoke Screens. Large-area smoke screens are usually produced by smoke generators, airplane smoke tanks, or smoke projectiles and are normally employed to conceal—

- (1) Road and bridge complexes along the main supply routes.
- (2) Artillery positions (including gun flashes).
- (3) Construction of battle positions.
- (4) Supply and service installations.
- (5) Troop and vehicular assembly areas.

- (6) Troop movements (including attacks and withdrawals).

- (7) River crossing sites and bridge construction.

b. Small-Area Smoke Screens. Small-area smoke screens are normally produced by the use of smoke pots, smoke grenades, and limited use of mechanical smoke-generating equipment, and are used to conceal—

- (1) Recovery of wounded personnel.
- (2) Recovery of damaged equipment.
- (3) Patrol activities (exit and entry through friendly lines).
- (4) Assaults on strong points.
- (5) Breaching of friendly or enemy minefields and barriers.
- (6) Relief of combat units.
- (7) Airstrips and helicopter pads.
- (8) Areas of the main supply route subject to enemy ground observation.
- (9) Road construction.
- (10) Specific areas of the forward edge of the battle area.
- (11) Landing of air assault units.

c. Dummy Screens. Either large-area or small-area smoke screens may be used to provide deception. Screens are established over unoccupied areas in order to confuse the enemy regarding friendly positions and plans.

75. Employment of Smoke Screens

Smoke haze and smoke curtains are commonly employed smoke screens in combat zone operations by smoke generator units:

a. Smoke Haze. When it becomes necessary to place smoke on our own troops and installa-

tions, the smoke haze provides the necessary concealment. The haze has advantages over the blanket in that large friendly objects, such as trucks and tractors, are visible for distances up to 100 meters. Such visibility allows near normal operations to continue for friendly units.

b. Smoke Curtain. The smoke curtain is employed when generator positions can be established between the edges of the battle area and when the wind direction allows screening parallel to the forward edge of the battle area with emplaced smoke. This type of smoke screen is desirable because it allows friendly operations, except observation and subsequent firing of weapons, to continue without being hampered by smoke.

76. Employment of Signaling Smoke

Signaling smoke is available in several colors and is used to—

a. Mark enemy or friendly positions by smoke emission on the ground.

b. Transmit specific messages by prearranged color codes. For further information see paragraph 118 and FM 21-60.

77. Planning Operations in the Combat Zone.

Smoke operations in combat zones usually are performed for definite periods of time or for specific phases of tactical operations. When the front is moving rapidly, smoke installations are maintained for a few days or less; if the front is more stationary, these installations may be maintained for weeks. Smoke screens are maintained in the combat zone as long as they are advantageous to tactical operations.

a. Unit SOP Plans. The smoke unit commander, following normal troop leading procedures, should have plans of operations in his unit SOP. These plans provide his staff and subordinate commanders with a guideline for preliminary action so that they can begin designated tasks before the smoke unit movement order is issued.

b. Movement of Troops and Issuance of Orders. Early planning and early issuance of orders for the movement of troops facilitate the

timely arrival of the troops at the designated location. The smoke unit commander plans where, when, and to whom his order is to be issued. For the smoke generator company, this movement normally is controlled by the company fuel supply platoon leader.

- (1) The smoke unit commander designates the time when the order will be issued. In selecting this time, he considers the total time available, the time needed for adequate reconnaissance by subordinate unit leaders, and the time needed for the actual preparation of the position. He should allot enough time to subordinate units for preparing positions—even if the additional time allotted prevents a detailed reconnaissance on his part.
- (2) The smoke unit commander designates a person or persons who will receive the unit orders. In a smoke generator company, this includes the executive officer, platoon leaders, and the first sergeant.
- (3) Road clearances for movement are processed through the local Traffic Regulation Point well in advance of movement and in accordance with local supported unit SOP. The SOP of the unit through whose area the smoke unit must move should be evaluated; where unrestricted moves of small groups of vehicles (less than convoy size by SOP definition) are allowed, the formalities of clearance may be avoided. However, caution is advised in informal moves; all drivers must know where they are going.

78. Reconnaissance Planning

Upon receipt of order assigning a smoke screening operation, the smoke unit commander immediately proceeds to the unit to which his organization is being attached. Before departing on his reconnaissance, the unit commander issues a warning order for the unit to make the necessary preparation for deployment. Having received a statement of his mission, the smoke unit commander plans his reconnaissance. Before starting his terrain reconnaissance, the smoke unit commander makes a map

reconnaissance, determines the area to be covered, and selects the route. His reconnaissance is as detailed as time permits. He gives major attention to the more critical localities. He announces his route so that he can be located.

79. Coordination with Other Commanders

Adjacent and supporting unit commanders may be present at the time the general plan for the use of smoke is discussed by the G3 (or S3) of the supported unit.

80. Issuance of Orders

After completing his reconnaissance, the smoke unit commander goes to the point previously designated for the issuance of his orders. He makes such changes in his tentative plan as are required by his reconnaissance and by recommendations of his leaders. He then issues the unit orders and informs higher headquarters of the smoke unit's plan of operation.

81. Movement Into and Organization of Positions

After the orders are issued, the smoke unit commander supervises the organization of positions.

a. Movement Into Position.

(1) Daylight movements may be by infiltration to prevent the appearance of increased activity and to reduce the possibility of a target of opportunity for the enemy. In some instances such movements may require the unit to provide its own smoke cover; for example, concealing a main supply route over a mountain pass may be accomplished by infiltrating mobile generators into *marked* positions. Production of smoke may commence immediately without a formal command. Smoke pots are widely used to support this type maneuver because of their ability to produce smoke rapidly.

(2) Night movements are normally conducted in convoy, with the exception of occupation of positions in the combat zone. Control of night movements is extremely difficult. Reconnaissance

by units leaders is desired before the movement, which must be executed to reduce noise and confusion to the minimum.

b. Organization of Positions. To provide a measure of security generators are normally dug in. However, where movement and digging in are impractical because of enemy action, smoke screen produced by generators, smoke pots, or projected smoke munitions may be used to conceal the occupation and organization of positions. Additional security measures include—

- (1) *Camouflaging generator positions.*
- (2) *Digging in generators when possible and emplacing smoke pots to screen generator positions.* Generators on the edge of the smoke line are likely to be exposed; the enemy may seek first to destroy these generators and then may proceed downwind in an effort to knock out the other generators successively.
- (3) *Using secondary smoke screens to protect generator positions.* Personnel designated to produce smoke by burning pots should have entrenched positions on the outer perimeter of the emplacements.
- (4) *Preparing alternate positions for each generator during extended operations.* Movement of generators to alternate positions is normally made at night, through a communications trench, or is concealed by smoke.

82. Employment of Smoke in Enemy Areas

Smoke may be used in enemy areas to prevent hostile observation, to reduce the effectiveness of enemy aimed fire, to mark targets for attack, to designate fire support coordination lines (FSCL), and for signaling purposes. Smoke may also be used as a visual check on cloud travel when target meteorological conditions are marginal or uncertain for an otherwise highly desirable chemical or biological attack.

a. Artillery. Small-area smoke coverage in enemy territory is best achieved by the use of WP and HC projected by mortars and artillery.

The antipersonnel characteristics of WP produce a bonus effect. Smoke ammunition expenditure tables and guidance for their use are given in paragraphs 96 through 98.

b. *Aircraft.* U. S. Air Force, Army, Navy,

and Marine Corps aircraft can lay smoke screens by means of smoke tanks or smoke munitions. Smoke bombs or rockets are used to mark positions on the ground or to signal. For additional information an employment of smoke by aircraft see chapter 6.

Section VI. SMOKE OPERATIONS IN REAR AREAS

83. General

The rear area is defined as the area in the rear of the combat and forward areas and comprises the Army services area and communications zone. The primary purpose of smoke employment in this area is to interfere with enemy direct aerial observation and visual attack bombing. Smoke screens are employed in these areas to conceal installations and activities and to deceive and confuse the enemy. In

addition, smoke employed in rear areas may provide a bonus effect by attenuating the heat and dazzle effects of nuclear weapons.

84. Attachment and Control

Smoke generator units in rear areas may be attached to any command requesting smoke support. The operational control of smoke units may be delegated to the G3 (S3) of the supported command. The smoke unit may be at-

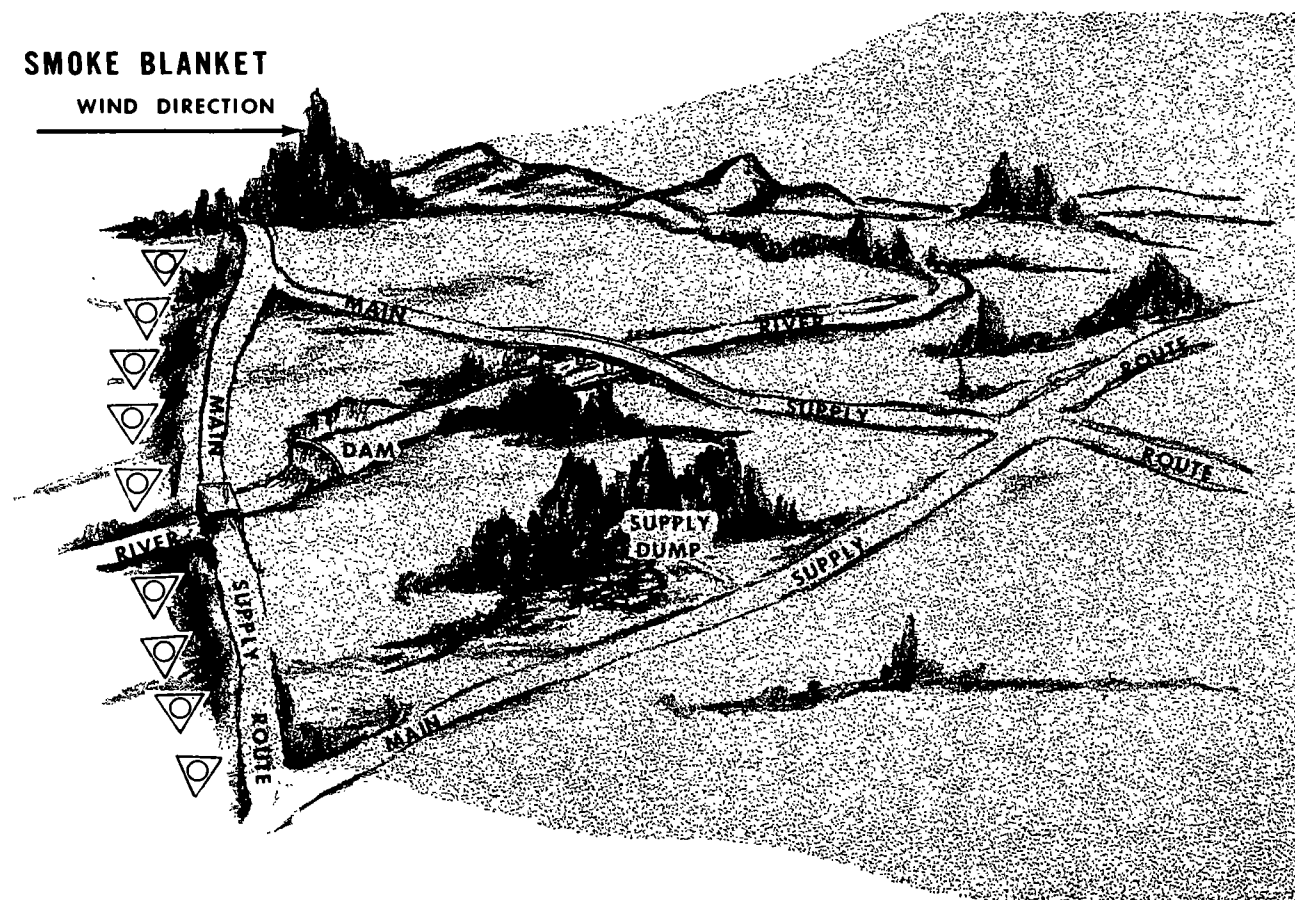


Figure 16. Type of land installation with smoke cover.

tached to the specific unit requesting smoke support. No matter where the operational control rests, the smoke unit commander gives advice and plans the smoke operation.

85. Installations in Rear Areas

Installations in rear areas are often maintained for longer periods of time than those in the combat zone, permitting the effectiveness of the smoke screen to be continuously improved. The two type of installations in the rear area are—

a. Land Installations. Land installations are those installations that are serviced directly by land transportation. Some examples of land installations are railroad marshaling yards, supply complexes, communications centers, and road and bridge complexes (fig. 16). Each land installation has its own peculiar smoke behavior characteristics due to the effects of local weather and terrain. The problems of estab-

lishing positions, communications, transportation, and resupply are basically the same for all land installations (para 73 through 82).

b. Land-water Installations. Land-water installations consist of land and water elements (fig. 17). This type of installation may have some smoke units operating on land and some on the water; it may have all smoke units operating on land but may require boat transportation for personnel, supplies, and communications. Some examples of land-water installations are naval yards, ports, dams and canal locks, and beachheads. The smoke units that operate on the land portion function in the same manner as those on land installations. Amphibious smoke units usually consist of boats, barges, or amphibious vehicles carrying personnel, smoke generators, floating smoke pots, and communications equipment. Whenever possible, stationary objects off-shore, like the

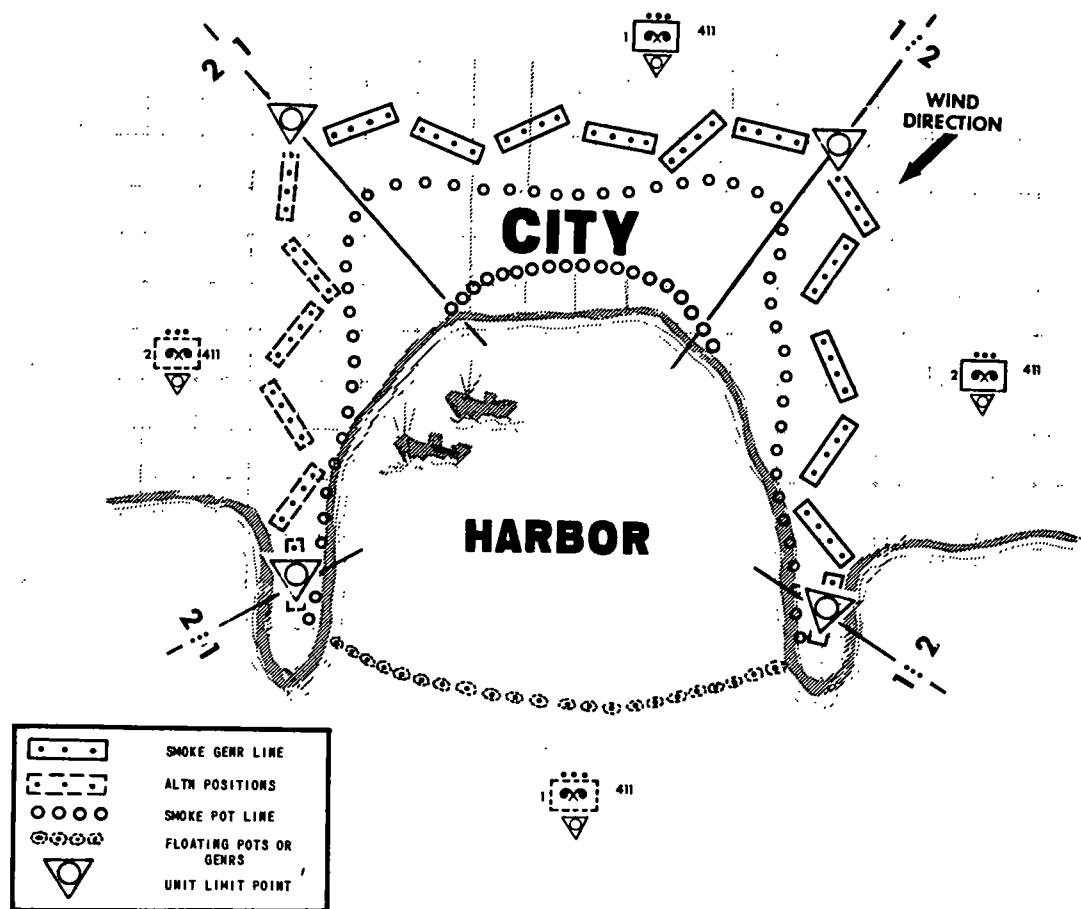


Figure 17. Type of land-water installation with smoke cover plan.

breakwater in a harbor, should be used for establishing generator positions.

86. Smoke Screens in Rear Areas

Smoke blankets and smoke hazes are used in screening installations in rear areas. Primary and secondary smoke screens may be used in the overall smoke plan.

a. *Primary Screens.* A primary screen, produced by smoke generators supplemented by smoke pots, is used to screen the selected area. To cover the area effectively in a short period of time, two or more smoke lines (para 45) may be used.

(1) *The inner line* may be composed of smoke pots or smoke generators, which are used to produce quick-cover smoke in a short period of time. For land installations smoke pots may be set off electrically. The inner line is prepared and maintained completely around the area to be screened.

(2) *The outer line* is normally composed of smoke generators. If ample time is available to produce an effective screen over the selected area, the inner line need not be used. It is not necessary to maintain generators completely around the selected area, although generator positions are selected and plotted on the operations overlay. Smoke generator positions are maintained on the upwind side. Mobile generators may be used to fill in sectors affected by wind shifts. To mount a smoke generator and a barrel of fog oil on the 1/4-ton truck, first remove the rear seat. With one smoke generator in the truck and one in the trailer, all 48 smoke generators are mobile for this type operation. Smoke may be produced from a generator mounted in a truck trailer while in motion.

Caution: in these mobile operations, always have a serviceable fire extinguisher available with each generator.

b. *Secondary Screens.* Dummy screens are used to confuse the enemy as to the exact location of the selected area. They should be of the

same type and size as the primary screen. Dummy screens are never established at the expense of reducing the effectiveness of the primary screen. A larger size screen over the selected area is more effective than a small dummy screen. Prominent landmarks should also be screened so that enemy aircraft cannot use such landmarks to locate the selected area. In preparation of deception plans, employment of smoke is considered.

87. Planning Operations in Rear Areas

The procedures for planning smoke operations in the rear area are generally similar to those for planning operations in the combat zone (para 77 through 79). Since it is not logistically feasible to provide continuous smoke coverage for rear area installations, it will be necessary for the smoke operations to be closely coordinated with the air defense warning system in the rear area. Sufficient warning time will be necessary to establish smoke coverage in the event of enemy air attack. If the mission is a land-water operation, additional equipment and supporting personnel may be required. The more important factors which should be considered in planning land-water smoke missions are—

a. *Sectors of Operation for Each Boat.* Each boat will be assigned a definite sector to insure an even distribution of the smoke producing equipment to produce an uniform screen.

b. *Distance From Shore to Amphibious Smoke Source.* Off shore projections such as land formations, wharves, and breakwaters should be used when possible.

c. *Amphibious Equipment Needed to Transport Smoke Equipment and to Establish a Smoke Line.* This may require support from other branches and technical services.

d. *Means of Resupply.* Designation of points for resupply of smoke munitions may be necessary for extended operations.

e. *Control of Boats.* Control of all boats must be centralized to facilitate the land-water operation.

f. *Communications.* This may require additional radio nets, messengers, and establishment of visual and sonic types of communica-

tions. Visual signaling may employ lights, panels, or pyrotechnics.

88. Area Security

When smoke units are attached or assigned in rear areas, the supported unit, installation, or Rear Area Protection (RAP) commander is responsible for rear area security. The smoke unit may be responsible for establishing internal communications and warning systems, and developing and practicing standing operating procedures. Operations should be dispersed as necessary, and defensive positions should be prepared consistent with effective execution of the mission.

89. Area Damage Control

When a unit has been subjected to a nuclear or CBR attack, an area damage control team is sent to its location. The senior member

of the team determines the operational effectiveness of the unit to which it has been sent, executes area damage control operations, and takes action to assist the unit in resuming its primary mission.

90. Use of Smoke in a Nuclear Environment

The procedures for planning smoke operations in the rear area during nuclear warfare are similar to those for planning operations in the combat zone during nonnuclear warfare. Special application of smoke coverage may include the employment of smoke to reduce the heat and dazzle effects of nuclear weapons provided ample warning of an enemy attack is given to the smoke unit responsible for providing the smoke coverage. Within logistical limitations it may be desirable to employ smoke to screen logistical complexes and other rear area installations which might be prime targets of enemy nuclear weapons.

CHAPTER 6

OTHER SMOKE DELIVERY SYSTEMS

Section I. AIR DELIVERY OF SMOKE

91. General

Means of delivery and employment of smoke is not limited to the smoke generator unit, nor is it limited to the army delivery systems. Army, Air Force, Marine and Navy aircraft can be used to deliver smoke munitions in support of land and amphibious operations. The discussion of smoke operations in this chapter is intended to familiarize army commanders with some of the smoke air-delivery systems available to support the combat mission.

92. Mark 12 Mod O Smoke Tank

a. Description. The mark 12 mod o smoke tank is designed for the production of vertical smoke curtains. The tank has a capacity of 40 gallons and weighs approximately 1,000 pounds when filled. When loaded and ready for operations, the tank is full of smoke agent which completely fills and surrounds approximately 500 aluminum spheres contained in the tank.

b. Employment. The mark 12 mod o smoke tank is used by the Navy and is available to Army units in amphibious type operations. A single aircraft can produce one 360-meter or

two 180-meter screens in about 30 seconds. The screen produced lasts for 5 to 15 minutes depending upon windspeed and atmospheric stability.

93. CBU Smoke Munitions

a. Description. The purpose of these munitions is to furnish tactical air forces with the capability to deliver screening smoke from high-speed tactical fighter aircraft. The CBU-11/A, CBU-12/A, and CBU-13/A smoke munitions are composed of the SUU-7B/A dispenser (fig. 18) and the BLU-16/B bombs, the BLU-17/B bombs, or both types of bombs, respectively. The BLU-16/B and BLU-17/B bombs evolved from modification of the M8 (HC) and M15(WP) smoke grenades, respectively. The CBU-11/A smoke munition consists of the SUU-7B/A dispenser loaded with 261 BLU-16/B bombs, the CBU-12/A consists of the same dispenser loaded with the same number of BLU-17/B bombs, and the CBU-13/A consists of the dispenser loaded with a mixture of 261 BLU-16/B and BLU-17B bombs.

b. Capabilities. A smoke screen 120 meters long, 25 meters wide, and 75 meters high, with a duration of 5 to 10 minutes, can be ob-



Figure 18. The SUU 7B/A dispenser.

tained with the CBU-11/A and/or CBU-12/A munitions, depending on flight conditions, release settings, number of dispensers used, and weather. Weather conditions have a definite effect on the density and duration of the smoke screen. Winds above 3 to 5 knots will reduce the smoke screen by at least half. The average duration of the effective smoke screening is about 6 minutes. The BLU-16/B bomb can be used in conjunction with BLU-17/B bomb on the same aircraft to produce more intense cloud obscuration. The BLU-16/B bombs will burn on the ground and the smoke will rise to meet the WP cloud formed by the airburst of the BLU-17/B bombs. BLU-16/B bombs should not be used over water since they will not burn or produce smoke under water and they do not float.

94. 100-Pound Smoke Bomb AN-M47A4

a. Description. The 100-pound smoke bomb AN-M47A4 (fig. 19) has a cylindrical body, a rounded nose, and a tapered aft section to which a box-type fin assembly is welded. The bomb is constructed of thin sheet metal and is threaded at the nose to receive an axial burster well, which extends to the aft end of the bomb body. The AN-M47A4 smoke bomb is filled with PWP or WP. PWP is more effective than WP because of its longer burning, reduced pillaring, and anti-personnel effects. Either the AN-M20 or the AN-M18 burster is used with the bomb. The AN-M18 burster is used when the bomb is to be dropped from low altitudes.

b. Employment. Smoke bombs are used to conceal all types of troop and ship movements and installations in both the combat zone and rear areas. The AN-M47A4 smoke bomb may be used to deliver either WP or PWP to a selected target by being dropped from an aircraft. It may be employed to deliver screening or signaling smoke. The AN-M47A4 bomb can provide an effective smoke screen for a duration of up to 5 minutes.

95. Air Delivery of Smoke Pots

Aircraft can be used to drop smoke pots from low altitudes to provide initial screening on land or water. The M4A2 and M7A1 floating smoke pots may be dropped from many



Figure 19. 100-pound smoke bomb AN-M47A4.

different types of aircraft. Specific information on the UH-1 and OH-13 is covered below.

a. *UH-1 Delivery.* The UH-1 helicopter can normally lift up to 44 M4A2 floating smoke pots (fig. 20). Two men strapped inside the cargo doors pull firing pins and drop the pots overboard as rapidly as possible. The M4A2 pots will withstand impact on hard ground and function properly when dropped from altitudes not to exceed 100 feet above

ground. The pots will burn for 15 to 20 minutes if released at an optimum altitude of 50 feet and a speed of about 45 to 60 knots. Although the pots will function when released from an altitude of up to 100 feet and a speed of 65 knots, the burning time is less and smoke-producing time is reduced to about 12 minutes. One UH-1 delivering M4A2 smoke pots in this manner can lay a screen 800 meters long.



Figure 20. UH-1 helicopter with a load of forty M4A2 floating smoke pots.

B. OH-13 delivery. The OH-13 helicopter can be rigged to carry eight M4A2 floating smoke pots in racks, between the landing skids (fig 21). The pots are releasable by tripwires from the cockpit. This system is useful for laying small screens, 100 to 200 meters

in length, or for plugging holes which might develop in larger screens laid by other means. This system can also be used for screening point targets or small targets with a degree of precision.



Figure 21. Side view of M4A2 smoke pots mounted on the OH-13 helicopter.

Section II. DETERMINING SMOKE AMMUNITION REQUIREMENT

96. General

This section is concerned with ammunition expenditures required to produce smoke screens by artillery shells. Smoke produced by bursting-type ammunition behaves differently from smoke produced by mechanical smoke generators and smoke pots. Smoke from WP

ammunitions, may form a "mushroom" effect. This pillar collapses when it cools and may merge with other bursts to produce a cloud formation. PWP (plasticized white phosphorus) burns slower than does WP, producing smoke with less pillaring. For additional information on smoke agents, see TM 3-215.

97. Smoke Ammunition Expenditures

Expenditures needed in smoke operations vary considerably with each specific mission. Although smoke ammunition expenditure tables III through V have been calculated for various artillery weapons under a variety of weather and terrain conditions, they are useful as a *guide only*. The amount of smoke ammunition required to maintain the smoke screen must be determined by observation rather than from the figures given in any table. Trained observers are needed to adjust a large-scale smoke screen to the target, to alter the screen to fit changing conditions, to keep the screen free of holes and gaps, and to increase or decrease the expenditure of smoke ammunition when necessary.

98. Use of Tables

Tables III through V give the approximate number of rounds per minute required to maintain smoke screens on a 500-meter front. About 3 minutes are required to adjust fire on the target and about 1 minute is required

to establish the smoke curtain. Smoke ammunition expenditures in these tables may be considered optimum for the stated conditions. The tables indicate the number of rounds that must impact in the target area. No allowance has been made for extra shells which, because of dispersion characteristics of the weapon, are needed to insure that the required number fall on the target. Additional ammunition required for this purpose must be considered by the commander of the firing unit, since dispersion varies with each type of weapon and increases with range.

99. Unit Capabilities

Unit capabilities to establish and maintain smoke screens vary according to the existing meteorological conditions in the target area. The size of an area over which a unit is capable of establishing and maintaining a smoke curtain can be determined by the use of two factors: (1) unit capability to deliver smoke rounds to the target (rate of fire), and (2) ammunition requirements for a 500-meter front (tables III through V). For example, a



Figure 22. Obscuring smoke.

mortar unit of four 4.2-inch mortars can effectively screen an average front of about 600 meters; under favorable conditions it can screen three times its average front; under certain unfavorable conditions it can screen only one-eighth of its average front

a. Smoke Curtain. A smoke curtain is established by employing volley fire, using twice the amount of ammunition during the first minute as is required to maintain the smoke curtain per minute thereafter.

b. Obscuring Smoke. This is a smoke concentration placed on enemy positions to deny enemy visual observation of friendly territory (fig. 22). Approximately twice as many rounds of smoke ammunition per minute are required to produce an obscuring smoke effect on a 500-meter front as are required to maintain a smoke curtain.

Table III. Smoke Ammunition Requirements for 105-mm Howitzers

SMOKE CURTAIN				
Number of WP rounds per minute required to maintain a smoke curtain on a 500-meter front ¹				
WIND DIRECTION ²				
Head	Tail	Flank	Quartering	
22	22	8	17	
OBSCURING SMOKE EFFECT				
Number of rounds per minute required to maintain an obscuring smoke effect on a 500-meter front				
50	39	8	33	
SMOKE CURTAIN USING HC BASE EJECTION SHELL ³				
Maximum meters between points of shell impact (parallel to front)		Rate of fire per point of impact (rounds per minute)		
WIND DIRECTION		WIND SPEED		
Head or tail	Flank	3 knots	9 knots	13 knots
27	360	1.0	1.5	2.0

¹ To establish a smoke curtain, employ volley fire, using 2-minute ammunition requirement. Equally space rounds on the front to be curtained.

² Wind directions are with respect to the enemy target or smoke screen.

³ To establish the initial curtain, fire two rounds per point of impact as quickly as possible; to maintain the curtain after that, fire at the rate indicated.

Table IV. Smoke Ammunition Requirements for 4.2-inch Mortars

A. SMOKE CURTAIN									
Number of WP rounds per minute required to maintain a smoke curtain on a 500-meter front in flank winds ^{1 2 3}									
Relative humidity (percent)	Temperature gradient ⁴	Wind speed knots							
		2	4	9	13	18	22	26	
30	LAPSE	13	13	11	11	13			
	NEUTRAL	9	9	7	7	9	9	11	
	INVERSION	6	6	4					
60	LAPSE	9	9	7	9	9			
	NEUTRAL	6	6	4	4	6	7	9	
	INVERSION	3	3	3					
90	LAPSE	7	7	6	6	7			
	NEUTRAL	4	4	3	3	4	6	6	
	INVERSION	3	3	3					
B. OBSCURING SMOKE EFFECT									

The number of rounds per minute required to maintain an obscuring smoke effect on a 500-meter front is obtained by doubling the values in A above.

¹ To establish a smoke curtain, employ volley fire, using 2-minute ammunition requirement (but not less than 10 rounds). Equally space rounds on the front to be curtained.

² For quartering winds, multiply table values by 2; for tail winds, by 2; for head winds, by 2½. Values for head and quartering winds are based on curtain impact line of 500 meters in advance of enemy line. Wind directions are with respect to enemy target or smoke screen. If curtain impact line is closer than 500 meters, ammunition requirements will be considerably larger. CONTROLLED FIRE BY OBSERVERS IS NECESSARY AT ALL TIMES.

³ Table quantities are for shell impacted on land. For water impacts, multiply table values by 1.4.

⁴ See paragraph 39 for an explanation of temperature gradient conditions.

Table V. Smoke Ammunition Requirements for 155-mm Howitzers

SMOKE CURTAIN				
Number of WP rounds per minute required to maintain a smoke curtain on a 500-meter front ¹				
WIND DIRECTION ²				
Head	Tail	Flank	Quartering	
7	7	3	6	
OBSCURING SMOKE EFFECT				
Number of rounds per minute required to maintain an obscuring smoke effect on a 500-meter front				
17	11	3	11	
SMOKE CURTAIN USING HC BASE EJECTION SHELL ³				
Maximum meters between points of shell impact (parallel to front)		Rate of fire per point of impact (rounds per minute)		
WIND DIRECTION		WIND SPEED		
Head or tail	Flank	3 knots	9 knots	13 knots
27	360	0.6	0.9	1.2

¹ To establish a smoke curtain, employ volley fire, using 2-minute ammunition requirement. Equally space rounds on the front to be curtained.

² Wind directions are with respect to the enemy target or smoke screen.

³ To establish the initial curtain, fire two rounds per point of impact as quickly as possible; to maintain the curtain after that, fire at the rate indicated.

CHAPTER 7

SPECIAL OPERATIONS

Section I. INTRODUCTION

100. General

Special operations are those in which the characteristics of the area of operations, the nature of the operation, special conditions under which the operation may be conducted, or a combination of these factors, require special or specially trained troops; special techniques, materials, and tactics; or an emphasis on certain considerations.

a. Information for the tactical commander and the smoke unit commanders concerning the use of smoke in support of special operations is contained in the field manuals pertaining to these operations.

b. Technical information for the smoke unit commander concerning the use of smoke in support of special operations is contained in this chapter.

101. General Operations Support

The planning and preparations for special smoke operations should be done concurrently with the supported unit. The smoke unit commander should, therefore, be notified as early as possible of the plans for his unit's participation in a special operation to facilitate co-

ordinated planning for the employment of smoke.

102. Planning Considerations

Upon receipt of information concerning his unit's participation in a special operation, the smoke unit commander must familiarize himself with the specific type of operation. He and his staff begin their planning by considering the special problems involved. Planning includes all of the detailed steps previously discussed in this manual. The basic principles of smoke support planning are equally valid in special operations. However, modification of some of the techniques involved may be required to satisfy special circumstances.

103. Training

A major problem faced by a smoke generator unit designated to participate in a special operation will be in the area of training. Training may be either for a specific operation or for continued operations in an area of special conditions, such as in the arctic or jungle. Commanders must make the most profitable use of time to train personnel in their understanding of the problems involved in the special operation.

Section II. ORGANIZATION OF A SMOKE GENERATOR COMPANY FOR WIDELY SEPARATED OPERATIONS

104. General

The term "widely separated operations" refers to situations in which the smoke company platoons are not supporting the same mission and are located more than 20 kilometers from company headquarters. The pla-

toon then becomes functionally independent except for combat service support, specialized maintenance support, and command control from company headquarters. The smoke generator company as presently organized operates best as a unit. When operations by

separate platoons are required, augmentation of TOE equipment and personnel becomes necessary.

105. Company Headquarters Organization

When the platoons of a smoke generator company are widely separated, the company headquarters is manned by the minimum number of personnel operating the headquarters and maintenance sections (*a* and *b* below).

a. Headquarters Section.

- (1) *Operations.* The executive officer is the coordinator of operations between the company and platoon headquarters. Operations personnel furnish operational and administrative support to the platoons. They coordinate all personnel and equipment moved on the vehicle messenger runs, receive platoon operations reports and consolidate them into a company operations report for submission to the next higher headquarters, prepare and distribute company operation order, order the official movement of personnel, and control vehicles dispatched by the company headquarters.
- (2) *Mess.* The mess steward supervises mess personnel. He is responsible to the company commander for records, rations, planning of meals, and maintenance of mess equipment at company headquarters.
- (3) *Supply.* The supply sergeant is responsible to the company commander for all company TOE, TA, and specially authorized equipment and the records for this equipment. He reissues this equipment to the platoons. Individual clothing and equipment are issued directly from the company.
- (4) *Personnel.* Personnel clerks carry out the normal administrative duties of the company.
- (5) *Communications.* Communications personnel establish telephone communications through locally established telephone nets whenever

possible. Company and platoon headquarters normally depend on messenger service for communications with each other. When radio and telephone equipment are used, security measures are taken to prevent the interception of information by the enemy.

b. Maintenance Section. The motor sergeant is responsible to the company commander for the operation of the company headquarters motor pool and the supervision of the platoon motor pools. On his inspection tour, the motor sergeant is usually accompanied by the welder. A parts clerk may be designated to keep the headquarters vehicle log book and the preventive maintenance roster and to supervise the records of the platoon vehicles. Organizational maintenance not available to the platoon is performed at company headquarters. All generators are distributed to platoons on the basis of platoon operational needs. Generators received from platoons for maintenance are given a technical inspection to determine maintenance requirements. Records of the location and condition of all generators are kept at company headquarters. Organizational repair parts required for maintenance of generators are requisitioned from the maintenance company supporting the unit. The senior smoke generator mechanic supervises platoon generator sections.

106. Fuel Supply Platoon

The platoon leader is responsible to the company commander for the fuel supply function in the company. The fuel supply platoon is organized into a platoon headquarters and two fuel supply sections. Normally the same fuel supply sections service the same smoke generator platoons. When the smoke generator platoons are detached on separate missions away from the company, one of the fuel supply sections is attached to each smoke generator platoon to provide fuel supply service. Personnel in the fuel supply platoon obtain, transport, and furnish fog oil and gasoline required for smoke operations. The fuel supply

platoon supervises the storage and use of fuel by the smoke company. The platoon also maintains a record of fuel supplies for the entire company and submits required reports.

107. Smoke Generator Platoon Organization

The platoon operating away from company headquarters in a tactical situation needs all of the specialized personnel found in a company headquarters with the exception of those from the personnel section. It needs mess personnel, motor maintenance personnel, and maintenance personnel for the unit's equipment. Thus, the authorized TOE and TA must be supplemented by special authorizations of personnel and equipment to insure the unit's ability to meet changing requirements of tactical operations. The platoon is manned by the maximum number of personnel available from the company, as follows:

a. Headquarters. The platoon headquarters includes the administrative personnel for the platoon. This headquarters functions in the same manner as company headquarters functions when the company is operating as a unit. The duties of the platoon leader parallel those of the company commander.

b. Motor and Generator. The motor and generator personnel supervise operators maintenance and perform organizational maintenance on the platoon's equipment. Maintenance support beyond the capability of the unit is provided by a functionalized direct support maintenance company. Generator support above organizational maintenance is furnished through company headquarters.

c. Mess. Mess personnel obtain equipment from the company under special authorization. When a smoke generator platoon is detached for a short period of time, it may be more economical to attach the platoon to the supported unit for messing.

d. Supply. The platoon leader, assisted by the platoon sergeant, controls platoon property. Rations and fuel are drawn locally.

e. Communications. Wire is the primary means of communication for smoke generator units. Communications personnel normally establish telephone communications between platoon headquarters and generator positions. If the distance between generator positions is not too great, the platoon can lay its own wire. After wire nets are installed, radios are placed on listening-silence for security reasons. Radio nets reopen as required when wire communications are interrupted.

f. Fuel. A fuel supply section determines, transports, and furnishes fog oil and gasoline to satisfy the fuel requirements of the smoke generator platoon. They operate and maintain the platoon dumps, the forward mission dumps, and the generator position dumps. They submit consumption reports to the fuel supply platoon headquarters.

108. Security

Each platoon of a widely separated smoke company must establish its own security. The platoon organizes its defense to fit into the defense plan of the supported unit. In combat zones, platoon leaders must be ready to deploy their personnel in defense of the unit and its installations.

Section III. OPERATIONS UNDER SPECIAL CONDITIONS

109. Cold Weather Areas

Smoke operations in arctic regions or other cold weather areas present special problems that are common to all types of units. Detailed information on arctic and cold weather conditions is given in FM 31-70, FM 31-71, FM 31-72, and FM 100-5. Preventive maintenance for individual equipment in arctic or other cold climates is given in appropriate technical manuals.

a. Operations. Mechanical smoke generators are capable of producing effective smoke clouds under arctic conditions when proper lubricants and fuel mixtures are used. For information on fuel mixtures and starting procedures in extreme cold weather, see the TM 3-1040-202 series.

b. Meteorological Considerations. On clear days an inversion condition exists over snowy surfaces; this condition is strongest about sun-

rise. Smoke tends to remain near the surface and may travel for long distances before being dissipated. Under extreme cold conditions, smoke clouds last longer than under more temperate conditions. Snow or fog so reduces visibility that the amount of smoke ordinarily required for effective screening is greatly reduced.

c. Camouflage. Special consideration should be given to the problem of camouflage, since there may be excellent observation for long distances over snow-covered terrain in dry, cold weather. The heat from generators and pots will melt the snow around the positions; therefore, it is important to camouflage the positions when the generator is not in use. The use of white covering or suitable camouflage nets simplifies camouflaging of men, equipment, and supplies in snow-covered areas.

110. Jungle Areas

Although the jungle ordinarily affords concealment from air and ground observation, smoke screens may be employed in jungle operations to screen aircraft landing areas, to help prevent observed fire on helicopters approaching landing zones, and to screen landing zones while troops are debarking helicopters in the landing zone. See paragraph 117 for details on the use of smoke in airmobile operations. In many instances the use of smoke may be limited to coastal regions to conceal landings; in other areas, smoke may be used to conceal river crossings or to provide coverage of rivers used as routes of communication. Smoke used in dense vegetation tends to spread slowly in a downwind and downslope direction and to follow creek beds and gullies.

a. Meteorological Considerations. In general, jungle weather is hot, humid and characterized by sudden changes. Within only a few minutes, clear, hot weather may change to torrential downpour. Wind speed in jungle areas normally does not exceed 3 kmph.

b. Transportation and Supply. Vehicle operation may be restricted to established roads or trails. Generator positions should be selected when possible, to permit supply of fuel by vehicular means. Although fuel can be supplied by use of 5-gallon cans hand-carried to

the generator emplacement, this arrangement is generally unsatisfactory. It may be necessary to use manpack or mulepack for transporting the fuel where the terrain prohibits the use of vehicles. Fuel may well be carried by helicopters in this situation, either by internal stowage or by external stowage using cargo nets. In any smoke operation where transportation is difficult, the possible use of helicopters should be considered.

111. Desert Areas

Deserts have certain characteristics in common—lack of water, absence of vegetation, large areas of sand, extreme temperature ranges, and brilliant sunlight. Because of meteorological conditions and the vast areas usually available for dispersing and maneuvering troops, it is difficult to make beneficial use of smoke units. However, in addition to its primary use of smoke as a screening agent, smoke can be used effectively for deception purposes. Smoke may be employed to screen an installation or the breaching of barriers and minefields and to cover artillery positions at night to reduce muzzle flash.

a. Meteorological Conditions. The desert sands absorb heat from the sun and cause appreciable horizontal temperature differences which in turn may cause whirlwinds. The soil is heated during the day to such an extent that smoke operations become extremely difficult because of the strong lapse conditions. Smoke is inclined to pillar because of the rising currents of air. High winds and dust storms occur throughout the year. The use of smoke is most effective in early morning and late evening or on an overcast day when neutral atmospheric conditions exist.

b. Transportation and Supply. There are few roads in desert areas, and these roads are very vulnerable to air and ground attack. Since transportation is extremely difficult over sandy areas, tracked vehicles or vehicles with low pressure tires are required.

112. Mountain Areas

Mountain operations are characterized by the difficulties encountered due to terrain. The generally inadequate road nets found in moun-

tain areas enhance the military value of existing roads and add importance to high ground which dominates other terrain. Smoke generators are used to screen artillery positions, supply routes, and preparations for installations and entrenchments and to reduce the enemy's capability of using high ground for observation. Small smoke units are often required to operate for extended periods with limited resupply in mountain operations because of the difficulties of transportation.

a. Meteorological Considerations. Steep hills split winds so that there is an eddying around the hill as well as over it. Thermally induced slope winds occur throughout the day and night. These conditions make it extremely difficult to establish and maintain a smoke screen. Wind currents, eddies, and turbulence must be continuously studied and observed.

b. Mobility. In order that the smoke unit may have mobility to shift a smoke line to compensate for shifting winds, it is advisable that one of the two generators transported by each vehicle be operated from the trailer and the other generator be emplaced. The emplaced generators are centrally located, whereas the trailer-operated generators are placed at the ends of the line. If a wind shift in either direction takes place, the trailer-operated generators can be moved quickly to the opposite end of the line. Where terrain conditions prohibit rapid displacement of generators, it may be necessary to utilize smoke pots to accomplish quick coverage of the area to be screened. In planning, the use of helicopters should be considered for the placement of generators in positions normally inaccessible to other modes of transport.

c. Transportation and Supply. In forward operations, access to roads is a limiting factor in the resupply of fog oil to generator positions when missions require continuous daytime screening. Track vehicles are used where resupply cannot be made by truck. Under extreme conditions and when the priority of the smoke mission demands it, helicopters may be used for the supply of fog oil.

d. Communications. In mountainous areas, there is usually a scarcity of commercial wire lines and the laying of wire is difficult or im-

possible. Terrain may prevent line-of-sight radio communications. Helicopters, light aircraft, rocket launchers, and rifle grenades may be used to lay wire across difficult terrain. Remote control of radio sets and automatic retransmission features of radio sets provide a means of obtaining extended range communications in difficult mountainous areas. Retransmission may be accomplished by using FM radio equipment AN/VRC-49; automatic retransmission may be accomplished using airborne radio-relay facilities (AN/VRC-54 radio set, mounted in aircraft). The establishment of such a communications system requires specially authorized equipment.

113. River Crossings

During a river crossing, the highest command directly concerned with the crossing usually assumes tactical control of smoke operations. Requests concerning the smoke operation are cleared through the overall tactical commander of the crossing operation. After the bridgehead has been established, smoke control at the bridgehead is relinquished by the crossing force and is passed to the unit or command in charge of the bridgehead.

a. Planning. For proper and efficient utilization of smoke equipment it is desirable that the smoke unit commander be informed of the overall tactical situation during phases of the smoke mission. The smoke unit should be included in the logistical planning as part of the assault team. This information will enable the smoke unit commander to obtain the necessary priority for men, equipment, and supplies to the far shore to maintain the screen, if necessary, from that shore. Plans for the smoke unit are coordinated with other elements of the assault team.

b. Placement of Smoke Generators. Except where the direction of the wind is toward the enemy, complete smoke coverage of a river crossing by generators or pots can be assured only by emplacement of generators and pots on both sides of the crossing. When there is a headwind in the initial stages of the assault, smoke projectiles are used to place smoke on the enemy bank. Behind this smoke, generators and pots may be emplaced on the bridgehead side. Before or during bridge construc-

tion, smoke generator personnel, equipment, and supplies are transported in boats from one side of the stream to the other. When direction of the wind is upstream or downstream, it may be necessary to have generators in boats upwind of the area to be screened, especially when generator positions on each side of the stream are too far apart to be effective. With a flank wind, pots and generators are placed near the river bank on either side of the river; if necessary, floating smoke pots and smoke generators transported by boats may establish the screen. In some tactical situations, it may be necessary to install the entire smoke line on the friendly bank. Normally, smoke personnel do not cross to the enemy shore until a bridgehead has been established by the assault troops. Helicopters may be used to drop smoke pots from low altitudes to provide initial screening on the enemy side of the river.

- (1) Generators and smoke pots should be grouped to produce a uniform screen along the entire front. A haze over the river can be increased in density as needed by land- or water-based generators or floating pots dropped from land or aircraft. Release of floating smoke pots into the stream, however, must be carefully coordinated with the engineer unit responsible for the bridge construction site.
- (2) Boats or other amphibious means used by smoke generator units for generators and floating pots must be obtained through the appropriate chemical officer from engineer or transportation units assigned or attached to the major unit performing the crossing operation.

c. Employment of Smoke. Smoke for screening river crossings is certain to draw enemy attention and, therefore, should extend over enough of the area so that the actual point of crossing will not be obvious to the enemy. Figure 23 shows smoke used to support a river crossing. Dummy smoke screens are used to draw fire and observation. When there is little likelihood of enemy aerial attack, a smoke curtain may be sufficient if it entirely obscures enemy ground observation. If the enemy

has observation over a large area, a haze may be required. When air attacks are likely, a smoke blanket may be necessary.

114. Amphibious Operations

Command of smoke operations in support of landing operations is initially the responsibility of the naval commander and is transferred to the army commander when assault forces are established on shore.

a. Missions. Some of the missions of amphibious smoke operations are to—

- (1) Screen the assault wave from aimed fire behind the landing beach.
- (2) Screen the flanks and prevent enfilade fire.
- (3) Screen demolition and reconnaissance units working on the beach.
- (4) Deceive the enemy as to the place and direction of the landing.
- (5) Interfere with the movements of enemy reinforcements.

b. Planning. During planning the following factors must be considered: supplementary means for making smoke, waterborne units, control of the smoke screen, and the overall tactical situation. During the concentration and specialized training periods, forces participating in the operation are assembled, organized into task forces, and trained jointly. The training includes operations of combat units in smoke screens. In supply planning, adequate initial supply to safeguard against possible delay in resupply must be considered. In most amphibious operations, adequate supplies must be carried by the boats that transport the smoke equipment. Additional boats must bring in the equipment and supplies necessary to maintain the screen after the beachhead is secured.

c. Means of Producing Smoke Screens. Floating smoke pots, mechanical smoke generators, and aircraft are used to establish and maintain smoke screens. Initial screens are made by boats carrying generators (fig. 24), pots, rockets, artillery or naval gunfire, or mortars; by aircraft with smoke tanks or smoke bombs; or by any combination of these. A

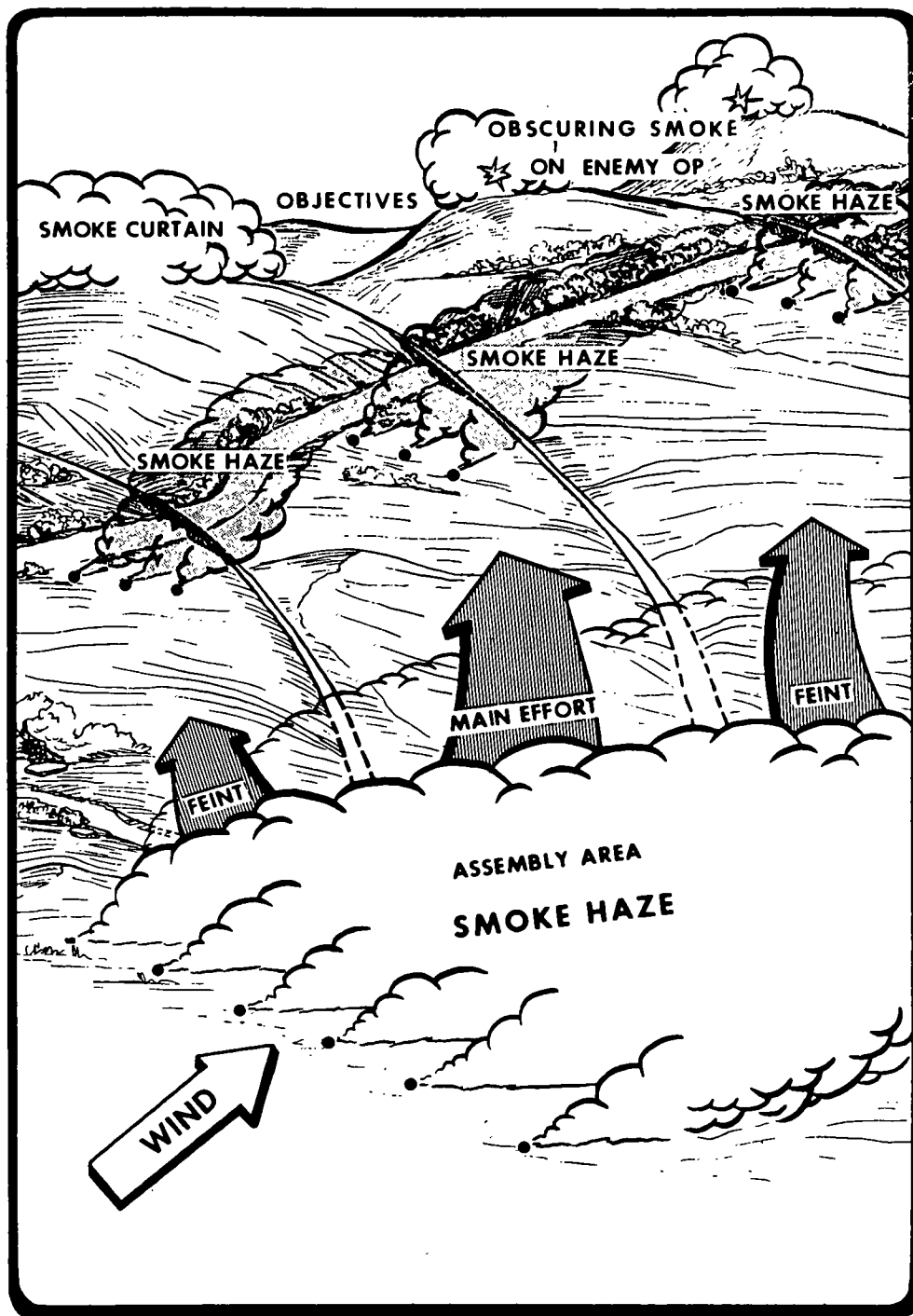


Figure 23. Smoke used to support a river crossing.

screen initiated by aircraft provides smoke protection for boats dropping smoke pots. Each boat carrying smoke pots may have a mechanical smoke generator to strengthen the screen. On shore the initial screen is estab-

lished by airplane smoke tanks, bombs, and/or smoke projectiles fired from ships. After the first assault wave has secured a foothold on the beach, smoke pots are emplaced on the shore and used to maintain the screen. Mechanical

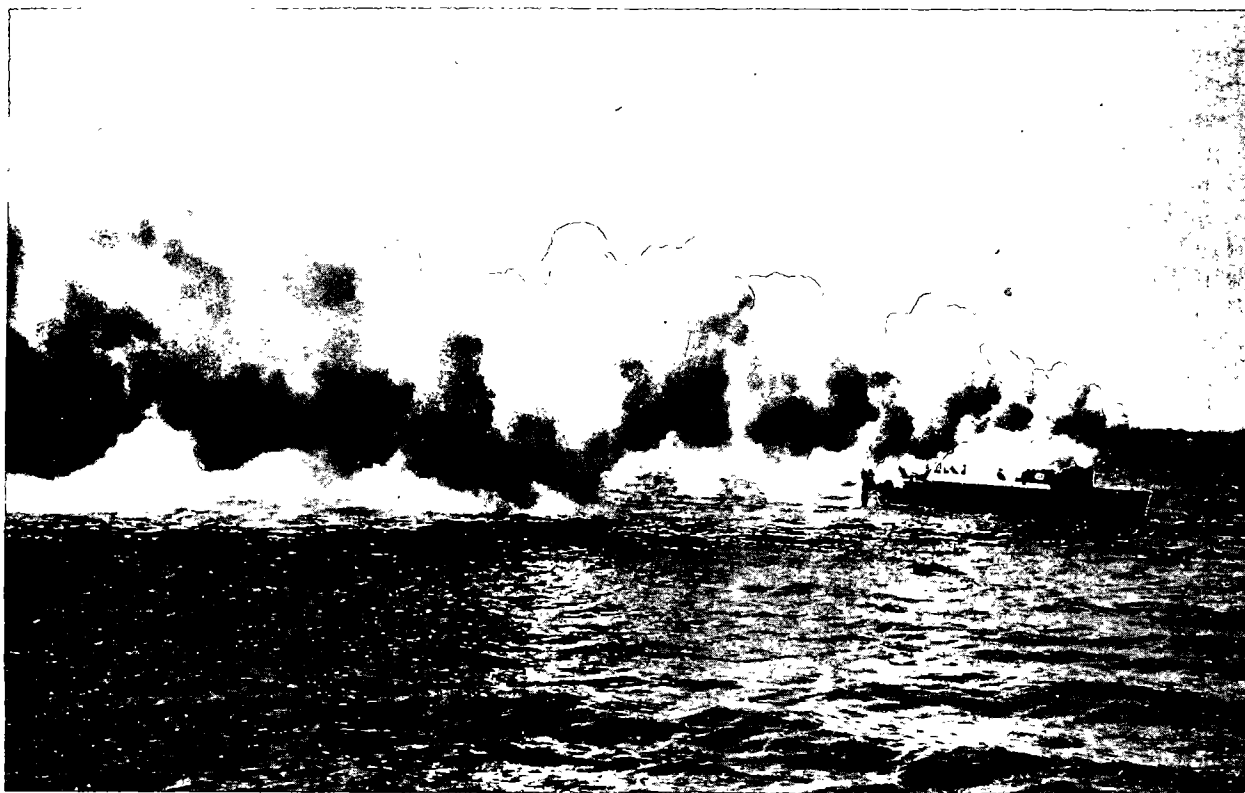


Figure 24. Smoke generator in operation on water.

smoke generators are landed as soon as it is feasible.

d. Types of Smoke Screens. In amphibious operations, smoke curtains may be used both frontally and on the flanks, as desired, depending on wind conditions. Smoke may interfere with the landings unless the smoke is accurately placed in proper volume and its downwind travel is considered. To be fully effective, the flank screens should cross the shore exactly at the ends of the landing beach and should never interfere with the landing craft. When the wind is blowing parallel to the beach, only frontal and downwind flank screens can be laid, since smoke from a windward screen would blow across the landing beach and its approaches. However, the first wave of the assault may be protected against fire on the windward flank by extension of the frontal screen upwind of the landing beach. The frontal screen should be placed on or close in front of the landing beach, and the downwind flank screen should be laid prefer-

ably at an angle of 45° to the beach. In any wind, screens are laid more easily when boats move against or across the wind.

115. Airborne Operations

Normally, smoke units will not accompany assault elements into the airhead; if planned for employment prior to linkup, smoke units will be airlanded during the later stages of operations. It may be necessary to use air delivered smoke to screen the drop zone during the airborne assault prior to the time that smoke generators can be airlanded. Helicopters may be used to deliver smoke units for operations within the airhead and for missions of deception in areas designated as dummy landing zones in much the same way that dummy screens are used in river crossings. Such employment deceives the enemy as to the extent of operations and adds to the deception desired in early phases of operations. Helicopters are also useful for delivery of smoke-producing equipment to inaccessible positions and in

resupply of these positions. Before ground contact with enemy units, smoke pots or generators may be used to deceive the enemy as to the actual location of assembly areas and objectives. In offensive air assault operations, screening smoke is planned and employed to deny enemy observation of the objective area during landing. Wind direction and the directions of approach and departure of aircraft are considered so that pilot visibility is not obscured. Concealing smoke is used to aid in accomplishing reliefs in over-flying operations. Maximum benefit is gained from use of smoke if it precedes the arrival of heliborne forces over the landing zone by not more than 30 seconds. Care must be exercised when using smoke in operations to insure that the reduced visibility does not benefit the guerrilla more than the friendly force.

116. Night Operations

Smoke can be used advantageously in night operations. Obscuring smoke placed on the enemy at night interferes with his operations and his observation of our operations. Some night vision devices will be adversely affected. Efficiency of light intensification devices can be reduced by utilizing smoke to attenuate the usable light energy. The employment of smoke against armor materially reduces its movement, direct fire, and observation capabilities. This night employment of smoke must be judicious so as not to interfere with friendly night movement, observation, and fire.

117. Smoke in Airmobile Operations

a. General. The screening characteristics of smoke make it highly effective for use in denying enemy observation during helicopter borne assault operations. Careful planning and coordination are required to insure successful accomplishment of the mission and to avoid use of smoke in such a way as to adversely restrict the movement of the helicopters. In airmobile operations, smoke screens may be established through air delivery means since smoke generators would have to be airlanded as a follow-up action to support the smoke screening operation. Smoke plans must consider the mission, terrain traversed, weather, wind direction, and possibility of change, al-

titudes of approach and retirement, location of rendezvous points, and known and suspected locations of enemy positions. Smoke may be used to deny the enemy observation, to obscure the vision of enemy positions and thus reduce the effectiveness of small arms and other observed fire, and to confuse or deceive the enemy through use of decoy screens.

b. Planning. Plans should originate with the helicopter-assault force or higher commander, and should be carefully coordinated with other appropriate commanders. Care must be taken to insure that the use of smoke does not interfere or adversely affect the helicopter borne operation. The following should be avoided:

- (1) Silhouetting the helicopters through improper employment of curtains or blankets.
- (2) Creating conditions, particularly in the landing zone area, that will obscure the vision of, misdirect, or confuse the pilots or debarking troops.
- (3) Disclosing the specific location of approach lanes through failure to provide curtains or large enough blankets.
- (4) Employing smoke if there is a possibility of obscuring the vision of or misdirecting helicopters.

c. Employment. Methods of employing smoke during the various phases of air-assault operations are—

- (1) *Helicopter approach.* Smoke curtains may be established along the edges of enemy-held territory over which the helicopters will pass. These curtains will serve to conceal the approach of helicopters until the last possible moment and may deceive the enemy as to the direction of the approach and the routes that will be used. Several curtains must be employed to avoid disclosing the location of approach lanes to the enemy.
- (2) *Traversal of enemy territory.* For lengthy routes over enemy territory, smoke blankets may be established over occupied enemy areas within small arms range of the route to be used. In addition, smoke may be em-

employed against any known or suspected enemy positions, observation posts, or air defense positions. When the positions of visually directed air defense weapons are not accurately known, smoke curtains may be established leeward of the helicopter route. For relatively short routes, wide smoke blankets may be used to cover enemy territory over the entire helicopter route.

- (3) *Landing zones.* Smoke may be placed on known or suspected enemy positions on terrain having observation into landing zones. Under favorable conditions of terrain and weather, smoke curtains may be placed on three sides of the landing zone, leaving one side open for approach and retirement of the helicopters. However, in both cases, care must be exercised to insure that smoke employed does not interfere with operations within the landing zone.

118. Support of Rear Area Counterguerrilla Operations

a. General. Initially, in guerrilla warfare when operations are conducted against small

bands of guerrillas, there is limited opportunity for employment of chemical smoke generator units. However, there may be opportunities for use of air delivered smoke during either ground or airmobile operations against guerrillas. If guerrilla warfare has escalated to the point that fighting is between companies or battalions, then judicious employment of smoke generator units may be advantageous.

b. Use of Smoke. Smoke may be used to deny guerrilla forces air and ground visual observation. This denial of observation may include troop and equipment assembly areas; weapons positions; combat service support installations; river-crossing sites; objectives; and landing of airmobile force. Care must be exercised when using smoke in counterguerrilla operations to insure that the reduced visibility does not benefit the guerrilla more than the friendly forces. Smoke can be used very effectively in counterguerrilla operations for signaling purposes. It is an excellent means for air-ground coordination especially when airborne command control helicopters are involved in all operations from company to division level. Smoke is valuable for marking flanks, positions of lead elements, emergency pick-up zones, medical evacuation points, small landing zones, and locations of targets.

Section IV. INTERNAL DEFENSE/DEVELOPMENT OPERATIONS

119. General

The doctrine for employment of smoke generator units and smoke operations in limited and general war operations applies, with modification, to internal defense/development operations.

a. Smoke generator units may be supporting elements which are conducting operations over broad areas of responsibility, and the operational plans of the battalion must anticipate the difficulties of communications and control. Most important will be the complete integration of operations into overall operations conducted in a particular area such as a military region, province, or district. This may require that support be given to United States/Host Country (US/HC) tactical

units in tactical operations, smoke generator support of HC agencies conducting internal security operations, assisting HC forces in military civic action, and assisting HC through advisory assistance by providing military training teams (MTT) to HC armed forces and paramilitary forces.

b. For general discussions of chemical units in internal defense/development operations, see FM 31-16, FM 31-22, and FM 31-73. For additional guidance in internal defense/development operations, see FM 100-5 and FM 100-20.

120. The Operational Environment

a. Many factors contribute to making the environment different from that of conven-

tional or nuclear positional warfare. Among these factors are—

- (1) The terrain generally is poor for operations.
- (2) Forces usually are dispersed over an extremely large area.
- (3) The adversary generally is elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

b. Winning the support of the people is a continuous requirement; in this respect, the application of firepower must be highly selective and restrained when operating among a population whose material and physical well-being must be protected in order not to alienate them from the HC government.

c. Since units usually are dispersed over extremely large areas, command supervision, to include training, maintenance, and other activities, will be much more difficult.

d. Small unit commanders and leaders frequently will be required to make decisions based on their own judgments, considering the situation at hand, rather than on specific guidance and direction from higher headquarters.

e. Security requirements will be considerably increased. Smoke generator units may require protection by other forces to preclude security requirements from hampering smoke operations.

- (1) All movement is subject to ambush and most movements must be treated as tactical moves, and appropriate actions taken. The organization of convoys, and degree of protection required, will depend on the actual or potential capabilities of the insurgents in the area through which the convoy will travel. See FM 21-16, FM 31-22, and the FM 7-series for tailed discussion of counterambush measures.
- (2) Smoke generator units in a static position may require perimeter protection. This can be achieved by using their own troops or by arranging for security forces from the supported unit, other US/HC armed forces, or

HC paramilitary and police units. See FM 31-22 and the FM 7-series for defensive measures.

121. Missions of Smoke Generator Units

Chemical smoke generator units may support U.S. Military Assistance Advisory Group (MAAG) missions, Military Assistance Commands (MAC), U.S. and/or HC armed forces, HC paramilitary forces, and U.S. and/or HC civilian agencies. This may entail support of HC internal security operations, assisting US/HC forces in military civic action, assisting the HC by providing advisory assistance; i.e., military training teams (MTT), to HC armed forces, paramilitary forces, or civilian agencies.

122. Organization

The chemical smoke generator battalion, and/or subordinate elements, may be attached or placed in direct support of U.S. units and/or HC tactical forces. Direct support or general support is desirable, since it allows the battalion flexibility in meeting smoke requirements throughout the operational area; however, since the supported units often may conduct several types and sizes of operations simultaneously, in widely separated locations, attachment may be the most common and desirable method of employment.

123. Tactical Operations

Smoke unit tactics and techniques must be modified to fit the special requirements of the operational environment and nature of the insurgent threat.

a. The scope of support for tactical operations will be considerably increased, particularly in underdeveloped areas of the world. Some important planning considerations are—

- (1) Decentralized and widely dispersed operations may require attachment of battalion elements to brigades and/or battalions for independent or semi-independent operations.
- (2) The terrain and the insurgent will preclude extensive use of wire lines, thereby increasing AM/FM radio usage.

- (3) Resupply of small, widely separated elements will be extremely difficult; therefore, elements supporting tactical operations should be authorized a special stockage of repair parts and tools.
- (4) There will be increased requirements at the lower echelons for independent decisions, initiative, and technical knowledge.
- (5) Additional liaison and supervisory personnel may be required when small subordinate elements are widely separated, to insure competent support of tactical operations.
- (6) There will be an increased reliance on and use of air couriers because of insecure land-routes of communications.
- (7) There may be requirements to maintain close liaison with HC civil, military, and paramilitary forces that may require exchange of technical personnel, compatible equipment, and interpreters/translators.
- (8) Increased security requirements will require added organic defensive measures, and may require additional security forces to insure safety and continuous operations.

124. Advisory Assistance

The smoke generator battalion/company may be required to provide advisory assistance, to include furnishing MTT, and training counterpart armed or paramilitary forces in branch subjects. Some specific advisory tasks which smoke generator units may perform are—

- a. Military Training Teams to HC military, paramilitary, and/or irregular forces.
- b. Smoke generator schools for HC armed, paramilitary, and irregular forces.

125. Military Civic Action

For detailed discussions of military civic action and typical projects, see FM 31-16 FM 31-22, FM 31-73, FM 41-5, FM 41-10, and FM 100-20.

126. Psychological Operations

Psychological operations (PSYOP) conducted or supported by smoke generator units must be integrated with and extend HC civilian/military information and PSYOP programs.

a. The PSYOP responsibilities of the battalion may be such that augmentation by PSYOP personnel from the 33-500 series TOE will be required.

b. PSYOP are of the utmost importance, and are of particular usefulness to units engaged in military civic action projects. A PSYOP campaign should be conducted before, during, and after the completion of a project. Requests for PSYOP assistance should be forwarded to higher headquarters. See FM 33-1 for detailed discussion of PSYOP.

127. Intelligence Operations

Intelligence plays an important role in combatting insurgency, with adequate and timely intelligence essential to the overall program. U.S. military personnel, with close and frequent contact with the civilian populace, are in excellent positions to collect information. Conversely, U.S. personnel must be careful of loose talk and the handling of classified material. For detailed discussion, procedures, and role of intelligence in internal defense/development operations, see FM 30-series and FM 31-22.

128. Internal Security Operations

Internal security operations include supporting U.S. and HC military and civilian police in their responsibilities to maintain a state of lawfulness, and taking actions to control human and material resources and to deny insurgent access to these resources. The smoke generator battalion may be called on to support internal security operations by—

- a. Providing personnel and equipment for mob and riot control.
- b. Providing personnel for police-type duty.
- c. Providing support to internal security forces and their operations.

CHAPTER 8

ADMINISTRATION AND LOGISTICS

Section I. RECORDS, REPORTS, AND ORDERS

129. General

Administration involves personnel management and record keeping and reporting. Record keeping and reporting involve organizational and individual records and reports. Orders consist of routine orders and combat orders. Battalion routine orders include court-martial orders, special orders, and memorandums. See AR 310-10 for details. Combat orders include operation orders and administrative orders. The unit commander is responsible for the unit's reports, and he should verify their accuracy to insure efficient administration. The smoke generator company is the basic unit having administrative functions; in this connection it publishes only company orders. See FM 101-5 for details of records, reports, and orders.

130. Records and Reports

Records and reports should be kept to the minimum, consistent with the requirements of the situation and instructions of higher commands. Records and reports are retained only until they have served their purpose, after which they may be destroyed unless they are filed with the journal or the command report. Records and reports that may be used in a smoke generator unit include the following:

a. Journal. A journal is a permanent record. Other records, such as overlays, become permanent records when filed with the journal.

b. Command Report. This is a permanent record.

c. Unit Report. The unit report becomes a permanent record when filed with the executive's journal or with the command report.

d. Message Center Log.

e. Situation Map, Overlay, and Chart.

f. Work Sheet and Data Sheet.

131. Operation Orders

An operation order may be oral or written, but regardless of composition it is the commander's formal statement to subordinate commanders to effect the coordinated execution of a tactical operation. Operation orders must be clear, timely, and concise. They must contain as much information as possible by overlays and sketches and must be easily understood. Operation orders must be issued in sufficient time to allow subordinate commanders adequate time for reconnaissance planning and preparation and for issuance of orders to their subordinates. The smoke battalion normally prepares written operation orders. Company orders are normally oral orders or are prepared as overlay-type orders. Orders are based on the operation orders issued by the supported unit. A type battalion operation order is illustrated in appendix C.

a. Operation orders are classified as warning orders or orders of execution. Warning orders warn of impending operations and contain information as to actual time and method.

b. Operation orders follow the 5-paragraph from outlined in FM 101-5. Annexes and other material assist in clarifying and simplifying the order; however, brevity should always be considered. Clarity should not be sacrificed for the sake of brevity. Preparation of the operation order is the responsibility of the smoke unit commander and is normally accomplished by the operations officer.

132. Administrative Orders

Information concerning administrative support of an operation is contained in the administrative order. Administrative orders should be published at the beginning of an operation and as frequently as required there-

after to keep administrative instructions, current. When the data are not too lengthy, administrative information may be contained in paragraph 4 of the operation order. Administrative orders are not normally prepared at company level.

Section II. LOGISTICS, MAINTENANCE, AND EVACUATION

133. Supply Discipline

It is the smoke unit commander's responsibility to see that his unit is completely equipped, that the equipment is effectively used, and that the equipment on hand is actually needed. The unit commander enforces supply discipline to promote unit efficiency through care, supervision, maintenance, preservation, and conservation of all types of supplies and equipment. Supply discipline includes proper maintenance, salvage, vehicle recovery, and evacuation of captured material; prevention of hoarding; and the indoctrination of personnel with the importance of supply. Supply discipline is acquired through training and enforcement by the officers and noncommissioned officers of the unit. This training stresses the proper use of food, clothing, weapons, fuel, and motor vehicles. The equipment issued to and carried by each man should be that which he actually needs. No one should be permitted to throw away equipment, to use transportation unnecessarily, or to handle supplies carelessly or wastefully.

134. Supply Support

The battalion obtains supplies from designated direct support units. Rations, clothing, most individual and organizational equipment, and petroleum (including fog oil) are provided by direct support supply and service units. Repair parts for organizational and maintenance of unit equipment are provided by direct support maintenance units. Ammunition, to include smoke pots, are provided by direct support ammunition units.

a. It is a function of the battalion logistics officer (S4) or the company supply officer to maintain an adequate flow of supply. He must determine, in coordination with the commander and the battalion executive (or company

executive officer), requirements needed to fulfill the mission. His requirements must cover generators, pots, fuel, fog oil, and vehicles.

b. In planning smoke operations, the logistics officer should assume that the most unfavorable weather conditions predicted may prevail during the entire smoke operation. Before the start of the smoke operation, generator positions and forward dumps are stocked as completely as possible. Resupply is undertaken on the basis of a schedule established before smoke operations begin.

c. Distribution of rations is normally prescribed in the SOP's of higher commands. Packaged rations are normally issued during combat situations. However, hot meals are served at the company mess whenever possible. The company mess is located as near to the troops to be fed as the tactical situation permits. The unit commander arranges for hot food to be delivered to those troops who cannot come to the mess location. Individual mess equipment may be pooled for delivery with the food and returned after feeding for washing in the kitchen area. This procedure keeps the mess gear sanitary and makes it unnecessary to carry washing and rinsing water forward with the food.

d. Replacements for clothing and equipment are obtained by requisition. Logistical data pertaining to smoke generator units are contained in FM 3-8. Training ammunition is authorized in accordance with TA 23-100.

e. Fog oil, fuel oil, lubricating oil, gasoline, and greases are handled by the unit fuel supply point as indicated in paragraph 106.

135. Combat Load

The current TOE for the chemical smoke generator company authorizes a total of 48

smoke generators. The basic load of fog oil is three rounds (round is 55-gallon drum of fog oil) per generator or a total of 144 fifty-five gallon drums of fog oil. Other items of the basic load can be determined by using FM 101-10 or FM 3-8.

136. Maintenance

The smoke unit commander is responsible for the maintenance of all vehicles, generators, weapons, and equipment in the unit. Each individual is charged with care and preventive maintenance for his individual equipment. The driver of each vehicle and the operator of each generator are responsible for the care and preventive maintenance of their equipment. The unit commander discharges his responsibility by personal observation and frequent inspection of vehicles, tools, and equipment. See AR

750-5 for a description of the Army maintenance system organization and functions. FM 29-22 prescribes the procedures for maintenance support and related functions within the field army. It emphasizes direct and general support maintenance, evacuation, and disposition of unserviceable class II and IV materiel.

137. Medical Service

The smoke unit commander is responsible for the health and sanitation of his command. Medical service is provided by the supported unit or by the supporting area medical organization. Medical evacuation is prescribed in operational or administrative orders of higher headquarters. See AR 40-5 and AR 40-554 for health and sanitation responsibilities.

Section III. ADMINISTRATIVE MOVEMENTS

138. General

Administrative movements are conducted by a smoke generator unit when ground contact with the enemy is remote, both en route to and shortly after arrival at the destination. The smoke generator unit must be prepared to plan and execute administrative movements by land, air, and water. In planning for a type movement, some of the factors that should be considered are—the mission, what is to be moved, the size and composition of the unit, the distance to be traveled, the speed required, and the security classification of the movement. A smoke generator unit is completely mobile and can complete a motor movement with its basic load without additional transportation attachments. When additional transportation is required, it is normally requested through the supported unit. Administrative movements are generally conducted in two basic formations—the open column or the closed column. See FM 55-35 for detailed information on motor movements.

139. Planning

Movement planning may be organized into the following phases:

a. Warning Orders. Warning orders are pre-

pared and issued to subordinate units without delay.

b. Reconnaissance Party. The reconnaissance party is organized and its mission is assigned. A map and aerial reconnaissance may be made to assist in formulating a tentative plan, but a ground reconnaissance is made whenever time and the situation permit. The composition of a reconnaissance party varies with the requirements of the situation. When time does not permit the party to complete its reconnaissance of the entire route before the movements begins, it is dispatched as much in advance of the column as possible. Instructions to the reconnaissance party specifically state the extent and nature of the information required and the time and place the report is to be submitted. The reconnaissance party has four main missions—

- (1) To obtain detailed information of the route.
- (2) To locate obstacles and recommend alternate routes.
- (3) To determine the number of guards and guides required and their location on the route.
- (4) To recommend rates of march.

140. Detailed Movement Plan

The detailed movement plan may be developed as follows:

a. Organization of Column. Units are organized into serials and march units and are given an order of march so as to facilitate control and scheduling. Unit integrity is maintained in the designation of serials and march units.

b. Check of Reconnaissance Information. Results of the route reconnaissance are used to select routes and to determine the starting point (SP), critical points along the route of march, the release point (RP), and the rate of march.

c. March Computation. Based on the number of vehicles, formation, and rate of march, the serial time lengths are computed. See FM 55-35 for details.

d. Draft of March Table. Using the completed march computations, a draft march table is then completed.

e. Check of Plan. Utilizing the draft march table and graph, the movement plan is checked to insure that it conforms to the directive of the higher headquarters.

141. Quarters Party

The new area is prepared for the orderly arrival of smoke generator units by the quarters party. Organization and duties of the quarters party may be as follows:

a. Organization.

- (1) *The battalion quarters party* ordinarily consists of a commander (usually S1 or personnel officer) necessary communications personnel, a representative from each company, and security personnel.
- (2) *The company quarters party* usually consists of the executive officer, communications personnel, and security elements.

b. Duties. The quarters party commander indicates the location of subordinate units, formulates a plan to receive and guide units from the RP to their area, and selects locations for the unit's from the RP to their area,

and selects locations for the unit's command and administrative installations. Subordinate unit representatives select locations for the unit command post (CP), administrative facilities, and subordinate element areas. Communications personnel install necessary equipment to insure rapid control of units as they arrive in their assigned areas. Based on the order of march, a plan is formulated to guide each unit over a designated route from the RP to the unit's new area. It is imperative that guides be thoroughly familiar with the movement plan to prevent congestion in the vicinity of the RP. The actual dispatch of the quarters party may follow the issuance of the march order.

142. Trail Party

The trail party follows the march column. It may include the personnel and vehicles necessary to assist the trail officer in inspecting the departed area and correcting and reporting any deficiencies; placing necessary guards, flags, or lights to warn traffic approaching from the rear; picking up guides and route markers; and disposing of disabled vehicles and their loads.

143. Organization and Movement

The smoke unit commander may issue an oral or a written march order. A complete march order designates the route, critical points, destination, schedule, rate, time intervals, formations, organization of the column, serial commanders, and other details not covered by the unit SOP. A march table and strip maps may accompany the march order as annexes.

a. Organization for Movement. In the field, the battalion headquarters will normally be divided into two elements—a command post and an administrative echelon. Composition of these elements may vary, however, as covered in the unit SOP.

b. Movement of the Command.

- (1) The quarters party moves to the designated area, selects exact sites, lays out CP and administrative locations, and begins installation of communications.

- (2) All officers and enlisted men are informed of the destination and route to the new CP site prior to movement.
- (3) The command post displaces by echelons. Upon completion of the quartering party's work, the first echelon CP moves forward. Upon establishment of the first echelon in the new location, the rear echelon (administrative echelon) moves forward.
- (4) The executive officer notifies subordinate and higher headquarters of the change in CP locations.

c. Communications. Communications within the column are regulated by unit SOP, supplemented by necessary special instructions. Communications on the move are normally maintained by radio and visual and sonic signals.

d. Motor Column Halts. Halts may be in accordance with unit SOP, usually at stated intervals of time. When required, halts are made at previously reconnoitered locations where the standing is good and vehicles can move off the road. When trucks do not clear the road completely, guards are placed at the head and at the tail of the column to control passing traffic. When personnel detruck, they must stay off the road.

e. Control of Motor Column. For purpose of control, the smoke battalion with its attached companies is divided into march units and serials when necessary. A commander is designated for each serial and for each march unit but has no fixed position within his unit. A control officer moves at the head of each serial and march unit and is responsible for leading his unit over the prescribed route at the correct rate.

- (1) Serials and march units are sepa-

rated by time intervals prescribed by the march order.

- (2) Traffic control stations are established along the route to enforce march schedules, to transmit orders to commanders and control officers, and to control other traffic.

144. Bivouacs

A bivouac area is located in the field where troops are assembled for rest, rehabilitation, or training or where a rear installation is maintained. The comfort and convenience of the troops are considered, and shelter is provided by existing construction, tentage, or improvised means. A battalion or company bivouac may be selected by the unit to which the battalion or company is assigned or attached.

a. Selection of Bivouac Area. The following factors should be considered in selection of a bivouac area: cover and concealment, sufficient area to permit dispersal of personnel and vehicles, proximity to an adequate water supply, suitable road net, and firm well-drained ground for vehicles. Vehicles within the bivouac area are dispersed and camouflaged if the situation requires it. To prevent running over sleeping personnel at night, each vehicle moving within the bivouac area is preceded by a man on foot.

b. Security. An interior guard is organized to provide local security within the bivouac area. If necessary, the unit commander coordinates antiaircraft, antitank, and other security measures with the adjacent units. When the situation requires it, individual security measures are coordinated by the unit commander.

Section IV. COMMUNICATIONS

145. General

The role of the smoke generator is such that the demand on its communications system is constantly changing, and the commander must be prepared to reorganize his interior and ex-

terior signal communications system to meet the varying needs. The equipment provided to establish this signal communications system is authorized in the current TOE. Communications are established through the supported unit or through the nearest area signal center

as directed. The smoke unit commander considers many things when preparing his communications plan to support operations. The following factors govern his employment of organic signal communications equipment and determine requirements for additional signal and equipment:

- a. Mission of supported unit.
- b. Type of supported unit.
- c. Duration of operation.
- d. Requirement for dispersion.
- e. Attachments.

146. Responsibility

The smoke unit commander is responsible for signal communications within his unit. The unit signal communications system is normally controlled by the unit operations officer. The following general rules govern the estab-

lishment and maintenance of signal communications between smoke units and supported units:

- a. A smoke unit designated to support a unit establishes communication with the supported unit.
- b. All units are responsible for reestablishing interrupted communications from both ends of the interrupted system.

147. Communications Orders and Instructions

Signal operation instructions (SOI) are issued for technical control and coordination of communications within a command. Immediately upon attachment, a copy of each item of the SOI directly pertaining to communications of the smoke unit is furnished by the supported unit. The SOI contains items cover-

SCHEMATIC TELEPHONE NET

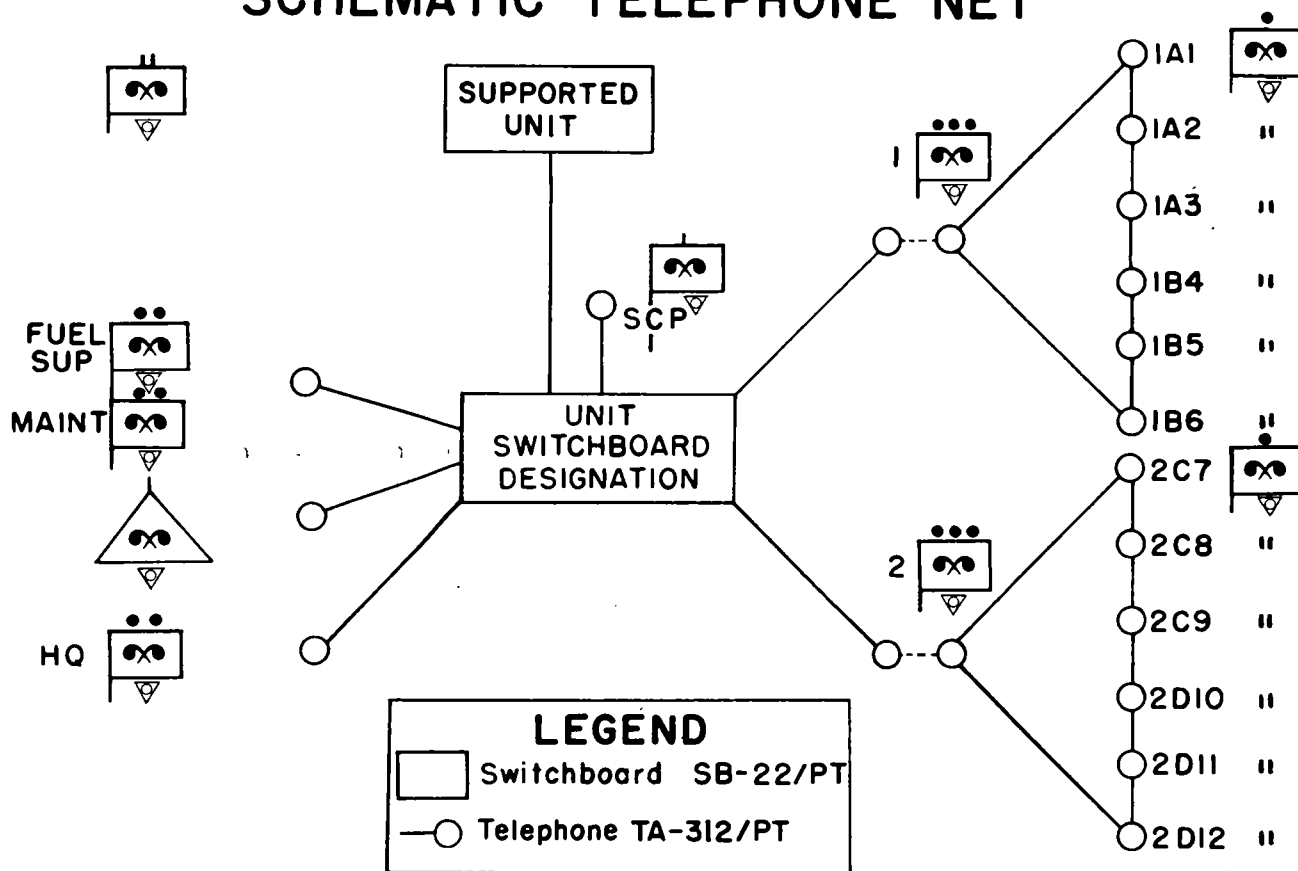


Figure 25. Smoke generator company wire communications net.

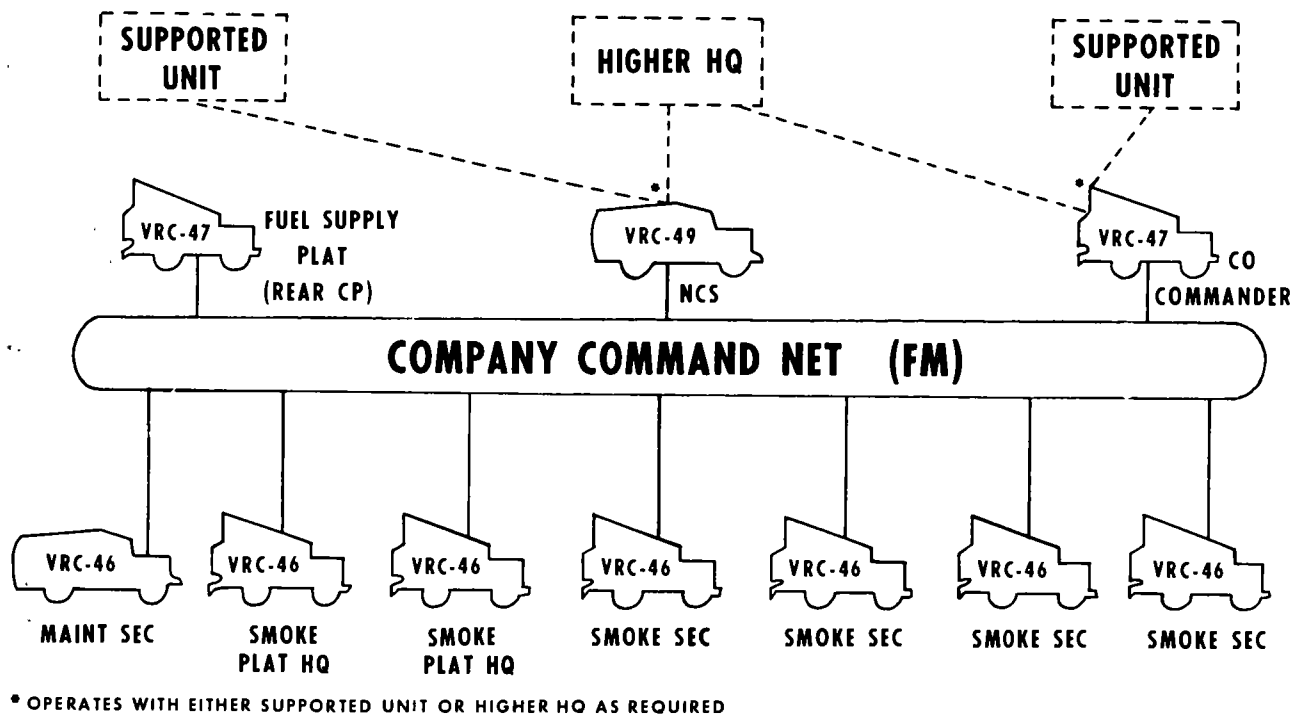


Figure 26. Type smoke generator company radio communications net.

ing codes, radio call signs and frequencies, telephone directories, and visual and sonic signals. Standing signal instructions (SSI) contain information and instructions on use of the SOI and may be prepared separately or as part of the SOI. The SSI may also include other technical instructions required to coordinate and control the communications-electronics operations of the unit. This document will also be available to smoke units on attachment.

148. Standing Operating Procedure and Operation Order

The unit standing operating procedure (SOP) contains a set of instructions covering those features of unit operations which lend themselves to a definite or standardized procedure without loss of effectiveness. The SOP is applicable unless prescribed otherwise

in special situations. It outlines standard procedures that the unit follows during operations to assist in performance of its mission, to speed its operation, to insure security, and to assist in ease of operation. The unit SOP should contain adequate information applicable to signal communications, since many of the operations pertaining to the communications system are similar regardless of the type of operation. Paragraph 5 of the unit operation order, whether oral or written, contains orders and instructions relative to communications and command. Specific signal instructions not included in other documents are included in this paragraph.

149. Means of Communication

The smoke unit commander utilizes any available means to implement an effective and a reliable communications network. The smoke

unit enters the communications system of the supported unit at the nearest communications facility and thereby obtains a communications channel to any installation integrated into the system. Repair of organic communications equipment which is beyond the capability of the smoke unit repair personnel is the responsibility of the DS/GS electronic maintenance unit supporting the smoke unit. The smoke unit commander utilizes the following means of communications:

a. Wire Communications. In relatively slow moving or stable situations, wire forms the basis of the signal communications system (fig. 25). Wire is the primary means of communication for chemical smoke generator units; therefore, wire nets are installed as rapidly as possible after a position is occupied. Time of installation and recovery, vulnerability to damage by enemy fires and by movement of troops, and availability of equipment often limit the use of wire.

b. Radio Communications. Because of the speed and simplicity of radio installation, radio is the primary means of communication (fig. 26) prior to completion of the smoke unit's wire net. After completion of the wire net, radio is used to supplement wire communications. Radio sets normally remain on

listening-silence after wire nets are installed, and radio nets are reactivated as necessary to supplement telephone communications. Radio is especially suitable to mobile situations. While not retaining the reliability of wire communications, radio is often the only means capable of continuous communication. Where great distances are involved, FM-voiced radio can be used for entry into the army area communications system to the supported unit via radio-wire integration facilities (RWI) at the nearest army area signal center. The vulnerability of radio communications to enemy interception, location, and traffic analysis must be constantly borne in mind by using personnel.

c. Messengers. Messengers provide the most secure means of communication and normally are the only means available for transmitting articles such as maps, overlays, and documents. Motor messengers are employed when extended distances are involved.

d. Visual and Sonic. Visual signaling employs lights, panels, hand signaling, or pyrotechnics, including colored smokes. Sonic signals may be used in combination with visual means. Sonic and visual signals are usually used to transmit short prearranged messages.

APPENDIX A

REFERENCES

Department of the Army pamphlets of the 310-series should be consulted frequently for the latest changes or revisions of references given in this appendix and for new publications relating to material covered in this manual.

FM 3-8	Chemical Corps Reference Handbook.
FM 3-10	Employment of Chemical and Biological Agents.
FM 3-12	Operational Aspects of Radiological Defense.
FM 5-15	Field Fortifications.
FM 5-20	Camouflage, Basic Principles, and Field Camouflage.
FM 6-20-1	Field Artillery Tactics.
FM 6-20-2	Field Artillery Techniques.
FM 7-20	Infantry, Airborne Infantry, and Mechanized Infantry Battalions.
FM 7-30	Infantry, Airborne, and Mechanized Division Brigades.
FM 11-8	Field Radio Relay Techniques.
FM 17-30	Armored Division Brigade.
FM 20-32	Landmine Warfare.
FM 20-33	Combat Flame Operations.
FM 21-5	Military Training Management.
FM 21-15	Care and Use of Individual Clothing and Equipment.
FM 21-20	Physical Training.
FM 21-26	Map Reading.
FM 21-30	Military Symbols.
FM 21-40	Chemical, Biological, and Nuclear Defense.
FM 21-41	Soldier's Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare.
FM 21-48	Chemical, Biological, and Radiological (CBR) and Nuclear Defense Training Exercises.
FM 21-60	Visual Signals.
FM 24-1	Tactical Communications Doctrine.
FM 24-16	Signal Orders, Records and Reports.
FM 24-17	Tactical Communications Center Operations.
FM 24-18	Field Radio Techniques.
FM 24-19	Communications-Electronic Reference Data.
FM 24-20	Field Wire and Field Cable Techniques.
FM 27-10	The Law of Land Warfare.

FM 29-3	Direct Support Supply and Service in the Field Army.
FM 30-5	Combat Intelligence.
FM 31-12	Army Forces in Amphibious Operations (The Army Landing Force).
FM 31-22	U. S. Army Counterinsurgency Forces.
FM 31-25	Desert Operations.
FM 31-30	Jungle Training and Operations.
FM 31-60	River-Crossing Operations.
FM 31-70	Basic Cold Weather Manual.
FM 31-71	Northern Operations.
FM 31-72	Mountain Operations.
FM 31-73	Advisor Handbook for Counterinsurgency.
FM 33-1	Psychological Operations, U. S. Army Doctrine.
FM 41-10	Civil Affairs Operations.
FM 54-2	The Division Support Command.
FM 54-3	The Field Army Support Command.
FM 54-4	The Support Brigade.
FM 55-35	Motor Transport Operations and Motor Transport Units.
(C) FM 100-20	Field Service Regulations, Counterinsurgency (U).
FM 101-10-1	Staff Officers' Field Manual; Organizational, Technical and Logistical Data—Unclassified Data.
TM 3-210	Fallout Prediction.
TM 3-215	Military Chemistry and Chemical Agents.
TM 3-220	Chemical, Biological, and Radiological (CBR) Decontamination.
TM 3-240	Field Behavior of Chemical, Biological, and Radiological Agents.
TM 3-400	Chemical Bombs and Clusters.
TM 3-500	Chemical Corps Equipment Data Sheets.
TM 3-1040-202-series	Generator, Smoke, Mechanical, Pulse Jet, ABC-M3A3.
TM 38-750	Army Equipment Record Procedures.
TB CML 100	Smoke Pot, HC, 10-lb, M1; and 30-lb, ABC-M5; Smoke Pot, Floating, HC, M4A2; SGF2, AN-M7; and SGF2, AN-M7A1.
TOE 3-266	Headquarters and Headquarters Detachment, Chemical Smoke Generator Battalion.
TOE 3-267	Chemical Smoke Generator Company.
TA 20-2	Equipment for Training Purposes.
TA 50-902	Clothing and Equipment (Mobilization).
ATP 3-7	Chemical Organizations.
SB 3-39	Basic Loads of Chemical Nontoxic Ammunition.

APPENDIX B

TYPE SMOKE PLAN

(CLASSIFICATION)

COPY NO. 4
10th Inf Div
BRIETENGUSBACH (8431)
101455 Jul 19____
GFD _____

Annex G (Smoke Plan) to Opord 12
Map: GERMANY, 1:50,000, BAMBERG/HASFURT.

1. SITUATION.

a. Enemy forces. Annex A (Intel) and current items.

b. Friendly forces.

- (1) Opord 12 and Annex B (Opn Overlay) to Opord 12.
- (2) 14th Cml Bn (SG) will support V Corps bridge installations and marshaling areas for helicopter operations.

c. Attachments and detachments.

- (1) One fixed wing aircraft from division aviation company.
- (2) Attach one platoon to 1/87 Infantry.

2. MISSION. 11th Cml Bn (SG) GS furnish smoke coverage at all division crossing sites and support division deception plan.

3. EXECUTION.

a. Concept of operation. Cml Bn (SG) support division crossing continuous smoke haze from 111200 until ordered to stop smoke.

- (1) Provide one company to support operations of each forward brigade.
- (2) Provide one company for deception mission in zone of 1st Inf Div. Direct communication authorized with CmlO, 1st Inf Div. Establish by 102400.
- (3) Provide one platoon to 1/87 Inf for landing deception operation. Platoon attached effective 110400.

b. Coordinating instructions.

- (1) Smoke control through div FSCE.

(CLASSIFICATION)

(CLASSIFICATION)

- (2) Div avn company furnish one fixed wing aircraft for smoke surveillance and control.
- (3) Maintain haze during hours of darkness.
- (4) Crossing priorities established H-4 hr dependent on metro conditions.

4. ADMINISTRATION AND LOGISTICS

- a. Div Class III (885 522) OPEN D-2 Div will provide fog oil for opn.
- b. Class V (822 424) OPEN D+1.

5. COMMAND AND SIGNAL.

- a. Signal. SOI index 1-1 is in effect.
- b. Command. CP 11th Cml Bn (SG) located vic div CP.

Acknowledge.

DIGAN
Maj Gen

Distribution: A

OFFICIAL:

/s/Benner
BENNER
G3

(CLASSIFICATION)

APPENDIX C

**TYPE OPERATION ORDER FOR A
CHEMICAL SMOKE GENERATOR BATTALION**

(CLASSIFICATION)

COPY NO. 5
811th Cml Bn (SG)
AICKIRCHEN (QUO 17323)
GERMANY
022200 Jun 19 ____
GA 107

Operation Order 56

Map: GERMANY, 1:100,000, REGENSBURG.

1. SITUATION.

a. Enemy forces.

- (1) Aggressor XXIV Rifle Corps continues defense of DONAU RIVER LINE.
- (2) Enemy expected to continue use of chemical agents in zone.
- (3) Continued use of nuclear weapons by aggressor expected.
- (4) Aggressor capable of 285 fighter bomber sorties daily.

b. Friendly forces. 10th U. S. INF DIV attacks 052300 June in zone to force crossing of DONAU RIVER and prepare for pass through of 301st Armd Div.

2. MISSION. This battalion provides smoke support for 203d Inf Div along DONAU RIVER.

3. EXECUTION.

a. Concept of operation. 811th Cml Bn (SG) will provide a smoke haze in support of assault river crossing of 203d Inf Div. This unit will plan for 360° coverage of operational area.

b. 21st Cml Co (SG). Atch 1st Plat 51st Cml Co (SG). Provide continuous smoke over DONAU RIVER in zone of 2/87 Inf. Emphasis to crossing sites at QU145218 and QU148239 and bridge at 183232.

c. 620th Cml Co (SG). Atch 51st Cml Co (SG) (-). Provide continuous smoke haze over DONAU RIVER from KAPFELBERG (QU186243)

(CLASSIFICATION)

(CLASSIFICATION)

to MINORITENHOF (TQ828292). Estb Radio relay on Bn Cml Net Vic (QU185289).

d. 69th Cml Co (SG). Provide continuous smoke coverage over junction of DONAU—NAAB RIVER (TQ830366) South to Ferry site at SINZING (TQ840311).

e. 51st Cml Co (SG). 1st Plat atch 21st Cml Co (SG), CO (-) atch 620th Cml Co.

f. Coordinating instructions.

- (1) Units plan 360° river line coverage.
- (2) Priorities of crossing smoke equipment announced 050100.
- (3) Maximum use of floating pots for position coverage.
- (4) Companies establish initial positions after 031000 Jun. Prepare to make smoke by 040300 Jun.
- (5) 57th, 103, 272d furnish liaison to 2/87 Inf, 2/7 Inf, 1/19 Inf, respectively.
- (6) Smoke haze continuous during hours of daylight, 50% operations during hours of darkness until moonset. 25% operation from moonset until daylight.
- (7) Smoke control by this headquarters.
- (8) Make and Stop Smoke on battalion order.
- (9) Make smoke at 040300 in event of communications failure.

4. ADMINISTRATION AND LOGISTICS. AdminO 14.

5. COMMAND AND SIGNAL.

a. Signal. SOI Index 1-1 in effect.

- (1) SOI index 1-() 203d Inf Div is in effect.
- (2) Radio Silence until H plus 2 hr.
- (3) Bn relay station (QU185289) ALT NCS.

b. Command.

- (1) Bn CP FRAUENHAUSEL (QU130253).
- (2) Smk positions complete by 040200.
- (3) Report CP locations.

Acknowledge.

JONES
LTC

Annexes: A-Operations Overlay (omitted)

Distribution: A

203d Inf Div
301st Armd Div
101st Cml Gp

(CLASSIFICATION)

(CLASSIFICATION)

OFFICIAL:

/s/ Adams
ADAMS
S8

(CLASSIFICATION)

APPENDIX D

**TYPE ADMINISTRATIVE ORDER FOR A
CHEMICAL SMOKE GENERATOR BATTALION**

(CLASSIFICATION)

COPY NO. 3
812th Cml Bn (SG)
AICKIRCHEN (QU017323), GERMANY
031200 Jun 19 ____
GB 106

Administrative Order 14

Map: GERMANY, 1:100,000, REGENSBURG.

1. SUPPLY.

a. C1 I.

- (1) Div distribution point, THONCOHE (PV967348).
- (2) Schedule for distribution:
All units—0145.

b. C1 II and IV. Army depots, all services, ZELL (PV920290).

c. C1 III.

- (1) Army supply point for fog oil only:
DEITFURT (PV890350).
- (2) Div distribution point for all Class III, less fog oil:
PAINTEN (QV060370).

d. C1 V. ASP 902, DEITFURT.

e. Maps. Unit distribution (SOP).

f. Water.

- (1) Water supply point 1, ELCHOFEN (QU140334).
- (2) Water supply point 2, NEVESSING (QU044240).
- (3) Local water contaminated.

g. Captured materiel. Bn SOP.

h. Salvage. Bn SOP.

(CLASSIFICATION)

(CLASSIFICATION)

2. EVACUATION AND HOSPITALIZATION. Battle casualties evacuate through the facilities of the unit to which attached.

3. TRANSPORTATION.

- a. Main supply route: WILLENHOFTEN (PV995441)—DVERLING (QV124357); two-way traffic.
- b. Highway WALDORE (QV095250)—HEMAU (QV035370); one-way.
- c. Highway DUERLING—BERATZHAUSEN (PV050420); one-way.
- d. Request clearance for all highway use through Bn S4.

4. SERVICE.

Fld Svc Co,	AICKKIRCHEN. Shower and bath schedule:
21st Cml Co. (SG); Hq, 11th Cml Bn (SG)	1740-1810.
51st Cml Co (SG)	0940-1010.
620th Cml Co (SG)	1000-1030.
69th Cml Co (SG)	1050-1125.

5. PERSONNEL.

- a. Strengths. Personnel daily summary as of 1800 submitted by 2000.
- b. Prisoners of war. Process through Hq, SPTD UNIT.
- c. Morale and personnel services. Mail pickup on 0700—1900 MSGR.

6. MISCELLANEOUS.

Special reports.

Generator fire reports daily 1900.

Acknowledge.

SMITH
LTC

Distribution: A

OFFICIAL:

/s/Jones
JONES
S4

(CLASSIFICATION)

APPENDIX E

CHARACTERISTICS OF SIGNAL EQUIPMENT

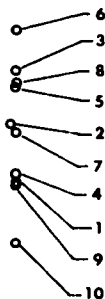
Nomenclature	Description and use	Reference
Receiving set, radio, AN/GRR-5.	A portable or vehicle-mounted AM radio receiver providing for the reception of AM voice, CW or MCW signals within a frequency range of 1.5—18 mc. Used by the headquarters section.	TM 11-295. TM 11-5820-284-series.
Radio set AN/VRC-46.	Same as radio set AN/VRC-43; except has manually tuned frequency selection and is not capable of remote selection frequencies. Includes receiver-transmitter RT-524/VRC. Frequency range is 30—79.95 mc. Used by the maintenance section, smoke company headquarters; smoke platoon headquarters, and the smoke sections.	TM 11-5820-401-series.
Radio set AN/VRC-47.	Same as radio set VRC-12, except has manually tuned frequency selection. Does not have intercom facilities and is not capable of remote selection of frequencies. Includes receiver-transmitter RT-524/VRC and auxiliary receiver R-442/VRC. Frequency range is 30—75.95 mc. Used by the company commander and the fuel supply platoon.	TM 11-5820-401-series.
Radio set AN/VRC-49.	Same as radio set AN/VRC-45, except has manually tuned frequency selection and is not capable of remote selection of frequencies. Includes two receiver-transmitters RT-524/VRC. Frequency range is 30—75.95 mc. Used as the Net Control Station (NCS) to higher headquarters, supported units, and the company command net.	TM 11-5820-401-series.
Switchboard, telephone, manual, SB-22A/PT.	A portable, local battery, monocord switchboard capable of connecting 12 local battery signaling lines or trunks, two of which may be one-way automatic-one-way ringdown trunks to civilian exchanges. Can be used for voice frequency teletypewriter circuits. Used by the headquarters section.	TM 11-5805-262-series.

APPENDIX F CONVERSION SCALE

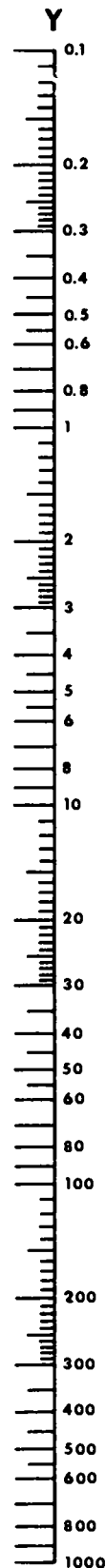


EXAMPLE:

1. Set 10 mph on X scale
2. Align through point 1
3. Read 16 km/hr on Y scale



X	NUMBER	Y
mph	1	km/hr
mph	2	knots
mph	3	meters/sec
mph	4	ft/sec
km/hr	5	knots
km/hr	6	meters/sec
km/hr	7	ft/sec
knots	8	meters/sec
knots	9	ft/sec
miles	1	kilometers
miles	2	nautical miles
meters	10	feet



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By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

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